INTRODUCTION

This Maintenance Manual has been prepared by the Service Publications Section of the Customer Service Department of Convair San Diego, Convair Division of General Dynamics Corporation in accordance with the Air Transport Association of America Specification Number 100. This manual contains instructions for airplane maintenance personnel to service, trouble shoot, and adjust and test the airplane systems and subsystems. It also includes instructions for removing and installing components normally replaced on the line or in the hangar. This manual does not contain information relative to the adjustment, testing or overhaul of components requiring special test equipment or tools and which is normally accomplished in the overhaul shops--this information can be found in the Overhaul Manual.

Information relative to flight and operation, repair of the airframe, airplane wiring diagrams, component overhaul, and airplane part and assembly numbers can be found in following publications:

PUBLICATION	NUMBER
880 Flight Manual	CS-59-019
880 Operation Manual	CS-59-020
880 Structural Repair Manual	CS-59-022
880 Wiring Diagram Manual	CS-59-023
880 Overhaul Manual	CS-59-024
880 Illustrated Parts Catalog	CS-59-025

CHAPTER NUMBERING SYSTEM

The material in this manual is divided into chapters and each chapter is further divided into subsystems or sections and subjects. Information on all components comprising a system or subsystem will be found in the chapter identified by the name of that system or by a general name indicative of several systems or subsystems which may be included in a chapter. As an example, all components used to generate and distribute hydraulic fluid under pressure are covered in Chapter 29, HYDRAULIC POWER, while the systems and their components utilizing hydraulic power are covered in their respective chapters. For instance, the landing gear hydraulic subsystem and its components are covered in Chapter 32, LANDING GEAR. Chapter 30, ICE AND RAIN PROTECTION, is an example of a chapter covering separate but related systems such as Wing Anti-Icing System, Windshield Anti-Icing System, Windshield Rain Clearing System, etc.

Each chapter uses a conventional three-dash numbering system. The first dash number identifies the chapter, the second dash number identifies a section within the chapter, and the third dash number identifies a subject within the

chapter section. The page number below the three-dash number indicates the type of material. The following example illustrates and briefly describes a typical chapter dash number:

35-1-5
Page 201

- 35 — This number identifies Chapter 35, OXYGEN.
- 1 — This number identifies the section within the chapter covering the Flight Crew Oxygen System and related components.
- 5 — This number identifies a specific subject (component) within the Flight Crew Oxygen System (section). In this manual the dash five (-5) number is assigned to the oxygen mask selector valve.
- Page 201 — The page number indicates the type of material and is explained under Page Numbering System.

The "dash zero" (-0) following the chapter number indicates that all material applicable to the complete system is covered in that section, e.g. 35-0 covers the complete Oxygen System. The "dash zero" (-0) following the chapter-section number indicates that all material applicable to a complete subsystem is covered in that section, e.g. 35-1-0 covers the complete Flight Crew Oxygen System.

PAGE NUMBERING SYSTEM

The page numbering system provided by the Air Transport Association of America Specification Number 100 further breaks down the material within a chapter into topics for ready reference and ease of revision. Each topic is assigned a block of page numbers as follows:

Description and Operation	Pages 1 through 100
Trouble Shooting	Pages 101 through 200
Maintenance Practices	Pages 201 through 300

Whenever the Maintenance Practices coverage involves sub-topics the combination of which becomes lengthy, each Maintenance Practice is treated as a separate topic and is assigned the following blocks of page numbers:

Servicing	Pages 301 through 400
Removal/Installation	Pages 401 through 500
Adjustment/Test	Pages 501 through 600
Inspection/Check	Pages 601 through 700
Cleaning/Painting	Pages 701 through 800
Approved Repairs	Pages 801 through 900

FIGURE NUMBERING SYSTEM

Figures (illustrations) are numbered consecutively within each topic as follows:

Description and Operation	Figures 1, 2, 3, etc.
Trouble Shooting	Figures 101, 102, 103, etc.
Maintenance Practices	
When not sub-divided	Figures 201, 202, 203, etc.
When sub-divided	
Servicing	Figures 301, 302, 303, etc.
Removal/Installation	Figures 401, 402, 403, etc.
Adjustment/Test	Figures 501, 502, 503, etc.
Inspection/Check	Figures 601, 602, 603, etc.
Cleaning/Painting	Figures 701, 702, 703, etc.
Approved Repairs	Figures 801, 802, 803, etc.

INDEXING

In addition to the manual Table of Contents preceding this introduction, each chapter is prefaced with a comprehensive Table of Contents which identifies the material within the chapter.

LIST OF EFFECTIVE PAGES

A List of Effective Pages precedes each chapter to advise the manual holder or user of the pages applicable to that chapter.

CHAPTER RESPONSIBILITIES

Convair San Diego, Convair Division of General Dynamics Corporation has prepared all chapters in this manual except Chapter 72, ENGINE, Chapter 73, ENGINE FUEL AND CONTROL, Chapter 78, EXHAUST, and Chapter 89, STANDARD PRACTICES - ENGINE; these chapters were prepared by the General Electric Company, manufacturer of the CJ805-3 engine. Chapter 74, IGNITION, Chapter 75, AIR, and Chapter 77, ENGINE INDICATION, were jointly prepared by Convair San Diego and the General Electric Company. In the chapters prepared by Convair San Diego, vendor components and units are covered to the extent for which information is available from the component manufacturers.

AIRPLANE SERIAL NUMBERS

Following is a cross reference tabulation of airplane registration numbers, customer model numbers and manufacturing serial numbers. The registration number is painted on the vertical stabilizer; the customer model number and manufacturing serial number are on the Airplane Identification Plate on the forward right side of the flight compartment bulkhead and inboard of the circuit breaker panel.

Registration Number	Customer Model Number	Manufacturing Serial Number
N801TW	22-1-1	00-1
N802TW	22-1-2	00-2
N803TW	22-1-3	00-3
N804TW	22-1-4	00-5
B805TW	22-1-5	00-6
N806TW	22-1-6	00-8
N807TW	22-1-7	00-9
N808TW	22-1-8	00-10
N809TW	22-1-9	00-12
N810TW	22-1-10	00-13
N811TW	22-1-11	00-14
N812TW	22-1-12	00-15
N813TW	22-1-13	00-18
N814TW	22-1-14	00-19
N815TW	22-1-15	00-20
N816TW	22-1-16	00-22
N817TW	22-1-17	00-23
N818TW	22-1-18	00-24
N819TW	22-1-19	00-25
N820TW	22-1-20	00-26
N821TW	22-1-21	00-27
N822TW	22-1-22	00-28
N823TW	22-1-23	00-30
N824TW	22-1-24	00-31
N825TW	22-1-25	00-32
N826TW	22-1-26	00-33
N827TW	22-1-27	00-34
N828TW	22-1-28	00-35
N829TW	22-1-29	00-38
N830TW	22-1-30	00-39

TEMPORARY REVISION NO. INTRO-1.

Insert facing INTRO, Page 4 basic (no date).

Page 4, this information supersedes the information on page 4.

Northeast Registration Number	TWA Registration Number	Customer Model Number	Manufacturing Serial Number
	N802TW	22-1-2	00-2
	N803TW	22-1-3	00-3
N8478H	N804TW	22-1-4	00-5
	N805TW	22-1-5	00-6
N8479H	N806TW	22-1-6	00-8
	N807TW	22-1-7	00-9
	N808TW	22-1-8	00-10
N8480H	N809TW	22-1-9	00-12
	N810TW	22-1-10	00-13
	N811TW	22-1-11	00-14
	N812TW	22-1-12	00-15
	N813TW	22-1-13	00-18
	N814TW	22-1-14	00-19
N8481H	N815TW	22-1-15	00-20
N8482H	N816TW	22-1-16	00-22
N8483H	N817TW	22-1-17	00-23
	N818TW	22-1-18	00-24
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	N820TW	22-1-20	00-26
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	N823TW	22-1-23	00-30
	N824TW	22-1-24	00-31
	N825TW	22-1-25	00-32
	N826TW	22-1-26	00-33
	N827TW	22-1-27	00-34
	N828TW	22-1-28	00-35
	N829TW	22-1-29	00-39
	N830	22-1-30	00-40
	N801TW	22-1-31	00-42

LIST OF EFFECTIVE PAGES

Chapter 6
DIMENSIONS AND AREAS

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*	6	i	Feb. 1/66	A-4
		Blank		
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	6-0	1	Mar. 20/61	A-2
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	6-0	11	Nov. 19/65	A-3
	6-0	12	Mar. 20/61	A-2
	6-0	13	Mar. 20/61	A-2
	6-0	14	Nov. 19/65	A-3
	6-0	15	Mar. 20/61	A-2
	6-0	16	Mar. 20/61	A-2
	6-0	17	Mar. 20/61	A-2
*	6-0	18	Feb. 1/66	A-4
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	6-0	21	Mar. 20/61	A-2
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Chapter 6
DIMENSIONS AND AREAS

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CHAPTER 6

DIMENSIONS AND AREAS

1. General

All airplanes are plotted about three reference planes; the longitudinal or X axis, the lateral or Y axis, and the vertical or Z axis. This plotting of the airplane, with respect to the reference planes, provides a means of locating components, distributing weight, and determining the center of gravity. A system of measuring known as station lines, water lines, and buttock lines is utilized in locating all components of the airplane. An understanding of this measuring system in addition to knowing the location of the more obvious points in the fuselage, wings and empennage will prove invaluable in quickly locating any components in the airplane. The following paragraphs and illustrations describe this measuring system and present the principal dimensions and areas.

2. Station Lines

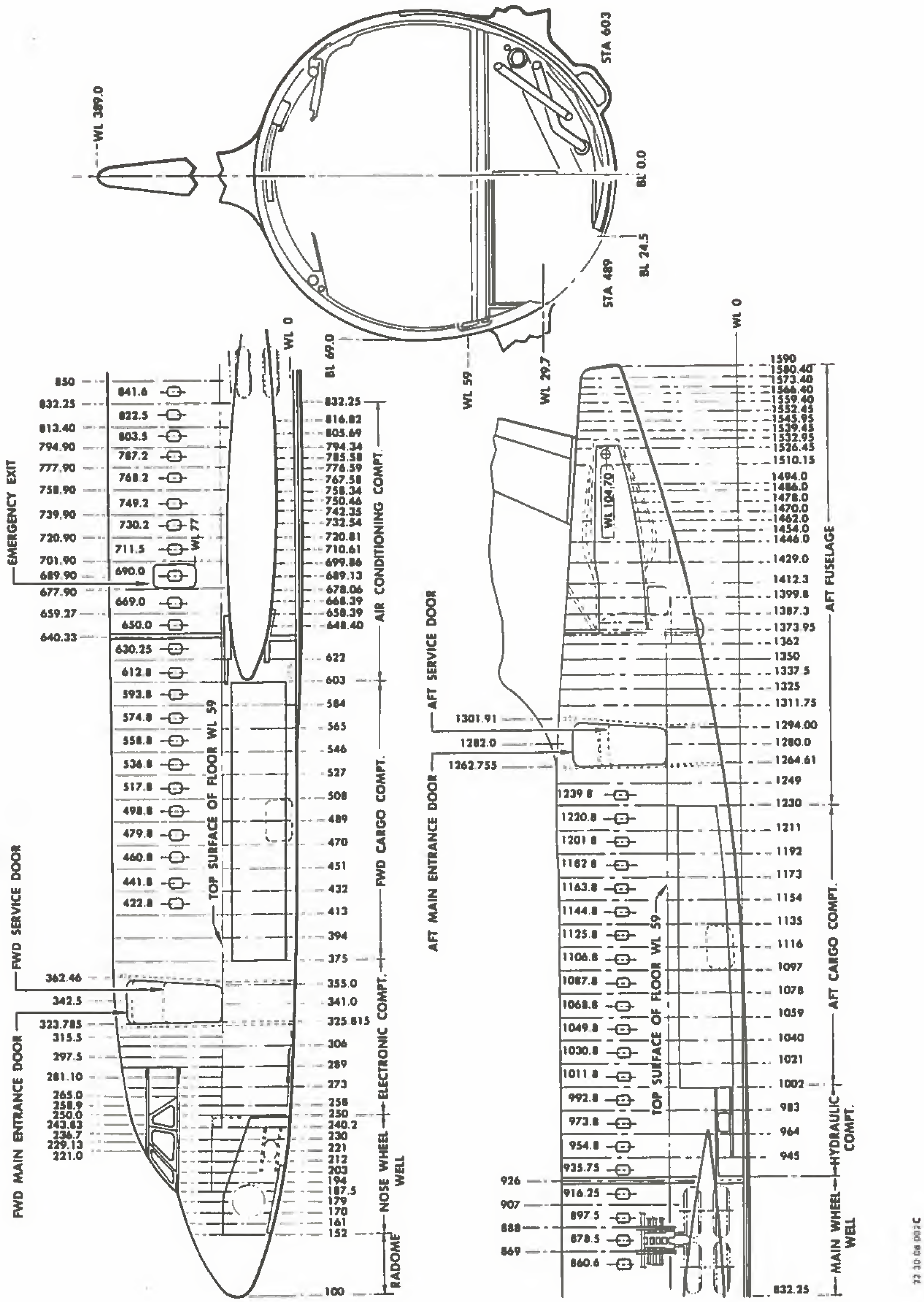
Station lines are used as a unit of measurement along the longitudinal axis of the fuselage, the lateral axis of the wings and horizontal stabilizer, and the vertical axis of the vertical stabilizer. All station lines are identified by their respective components, such as fuselage station lines, wing station lines, etc., and are measured in inches from an established reference point. The individual measuring systems for the wings, fuselage, engine pods and empennage are explained in the following paragraphs:

A. Fuselage Station Lines.

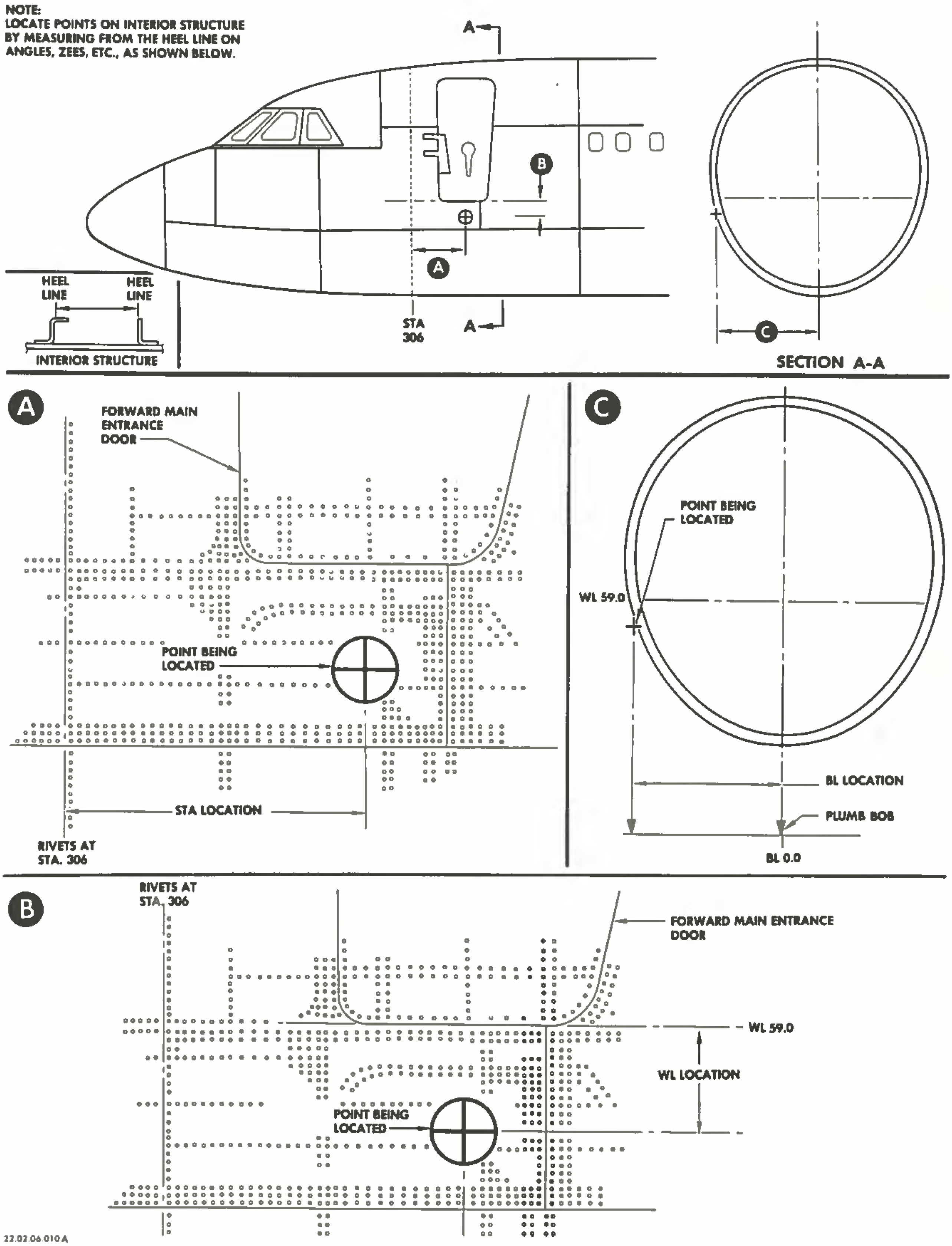
Fuselage station lines (FS) provide reference points along the longitudinal or X axis. These stations are measured from a point 100 inches forward of the airplane nose thus eliminating any negative station numbers. Fuselage stations progress aft from station 100 at the nose to the tail at station 1590. Figure 1 shows all the fuselage station lines for the frames, bulkheads, doors, windows, etc. from the nose of the radome to the tail. Figure 2 shows an example method for locating a specific point on the fuselage.

B. Wing Stations.

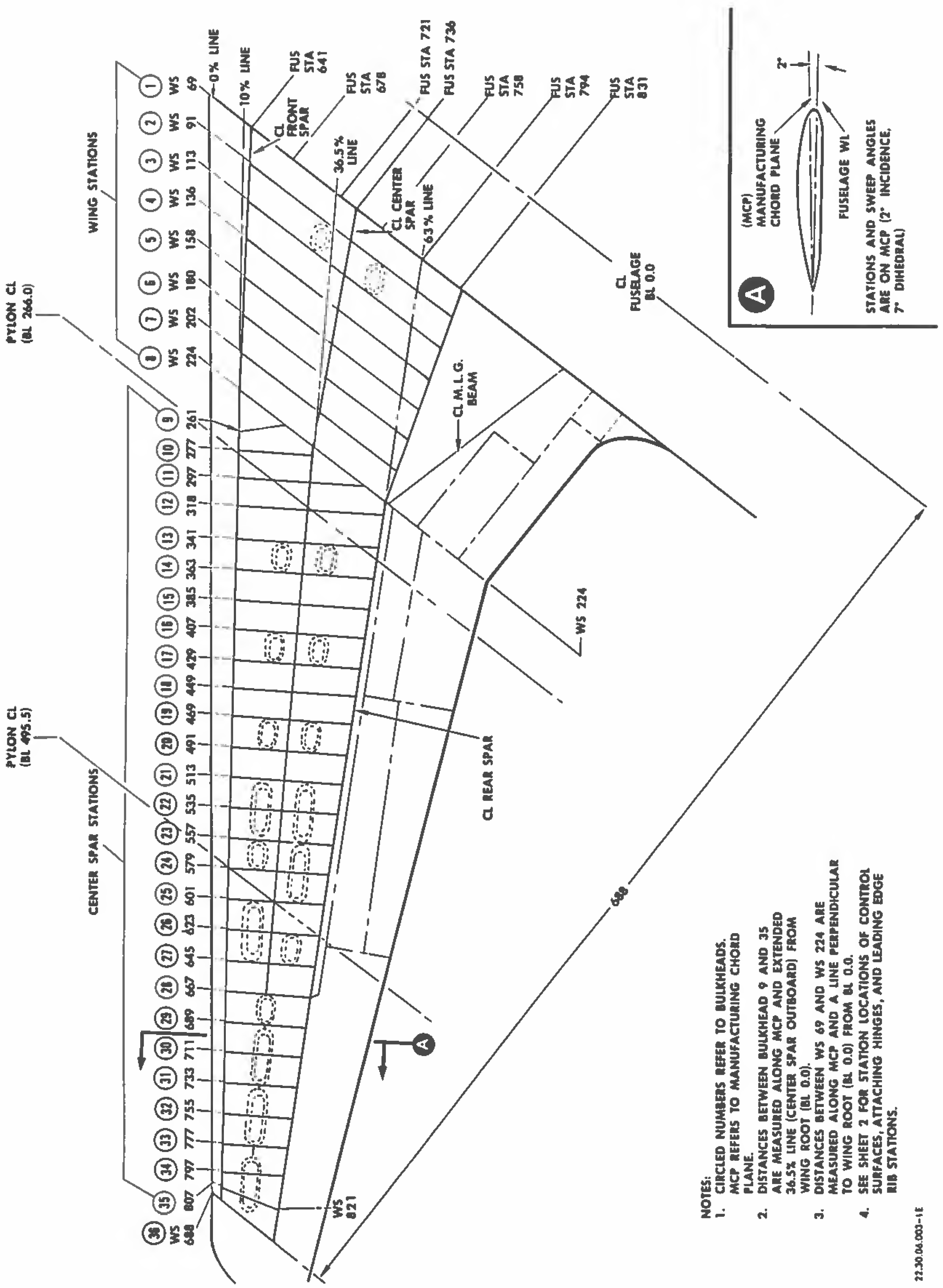
Wing stations (WS) are measured in inches from the centerline of the airplane to provide spanwise or lateral axis reference points, as shown on Figure 3. However, because of the seven-degree wing dihedral, they are measured along the wing manufacturing chord line and are not considered as buttock lines. Figure 4 shows an example method for locating a specific point on the wing.



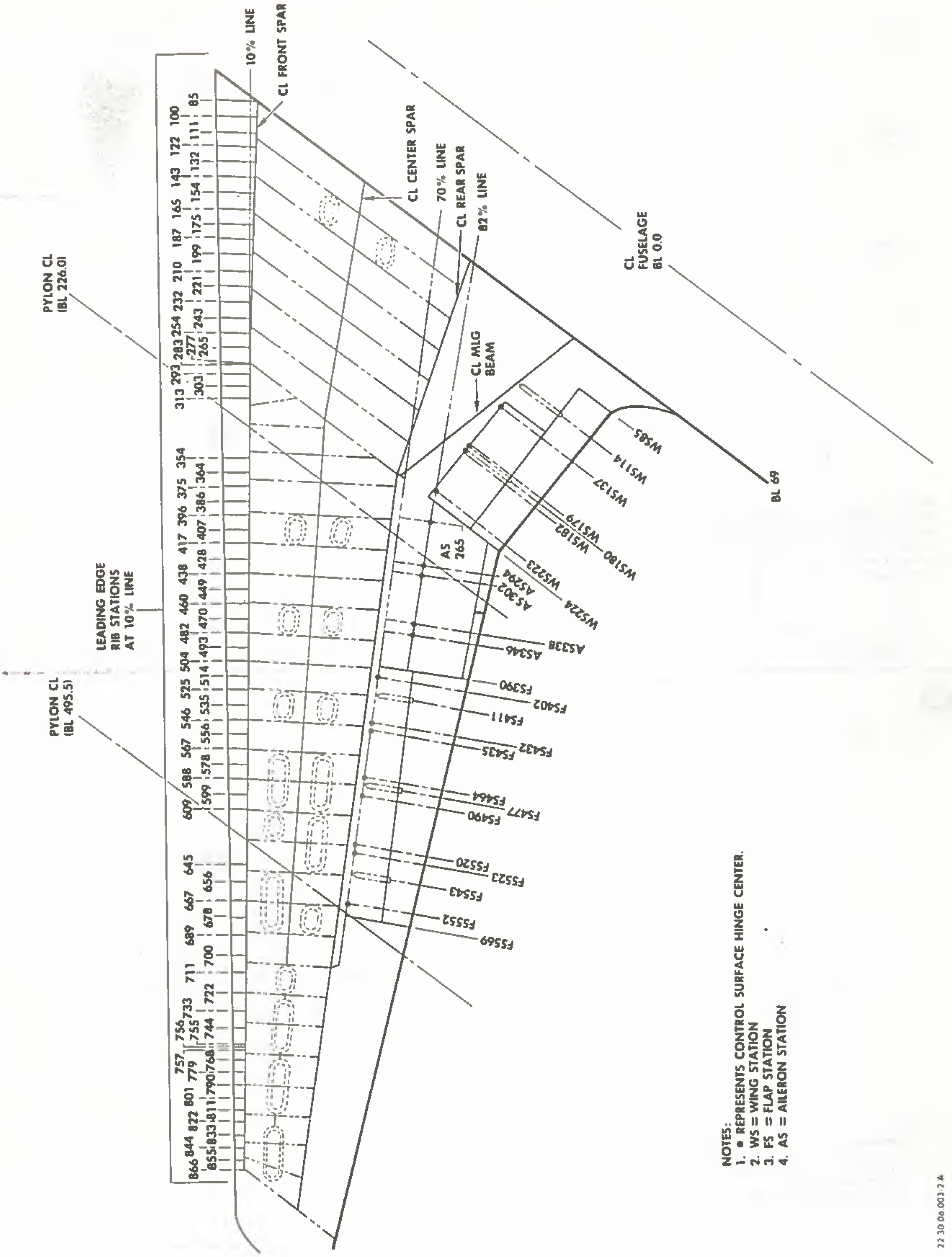
Fuselage Station Diagram
Figure 1



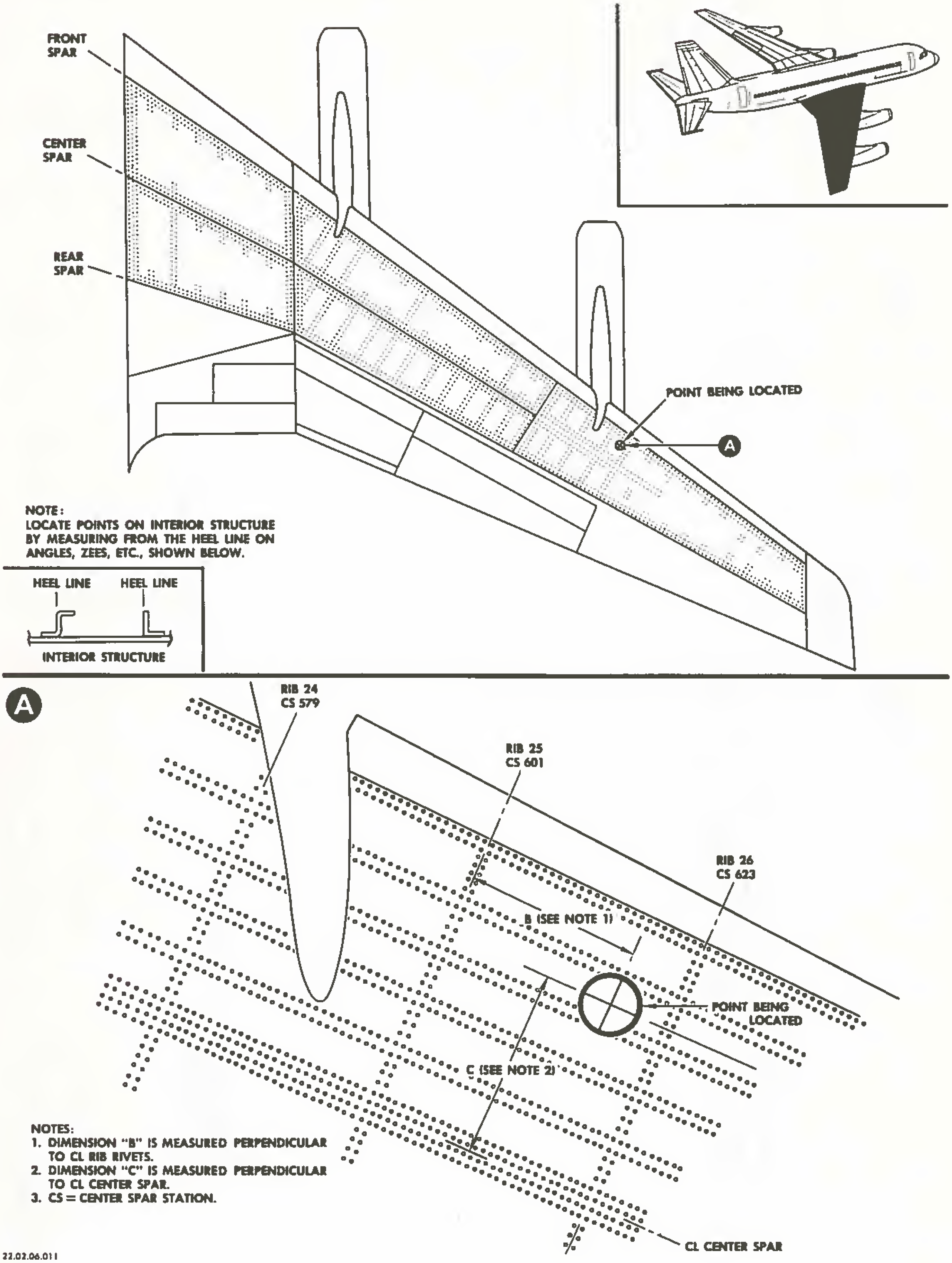
Fuselage Station Location (Example)
Figure 2



Wing Station Diagram
Figure 3 (Sheet 1 of 2)



Wing Station Diagram
Figure 3 (Sheet 2 of 2)



Wing Station Location (Example)
Figure 4

All wing stations between WS 69 and WS 224, and outboard of WS 688 are parallel to the centerline of the airplane. These stations are measured directly outboard, in the wing manufacturing chord plane, from the centerline along a perpendicular axis. WS 224 intersects the trailing edge at the break point of the wing and provides a very useful reference point.

Center spar stations between wing bulkheads 9 and 35 are perpendicular to the wing center spar which has a sweepback of 35 degrees. These stations are measured along the center spar manufacturing chord plane and the extended 36.5 percent line to the centerline of the airplane at the wing root. In addition to the wing or center spar station lines, all wing bulkheads and/or ribs are numbered consecutively from 1 through 36 starting at the first wing bulkhead (WS 69) outboard of the fuselage. Any of these numbers can be cross-referenced to a wing or center spar station line, if necessary.

C. Engine Pod Station Lines.

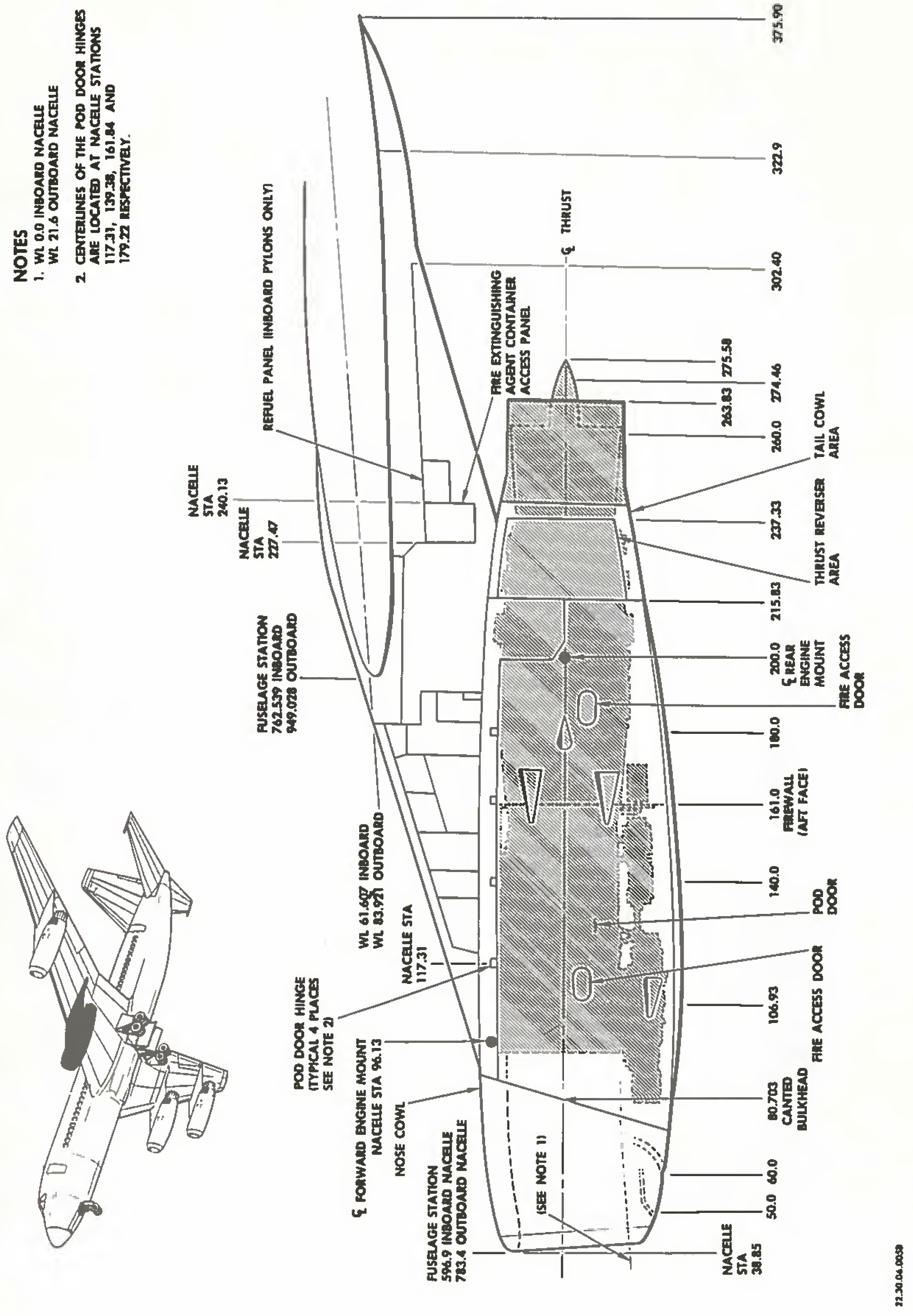
The station numbering system for the engine pods or nacelles and the pylons is independent of all other station numbering systems (see Figure 5). A zero reference point, located 38.8 inches forward of each of the engine intake cowlings on the longitudinal reference axis, has been established. Stations are measured in inches from this point aft. The rear engine mount centerline is a centrally located point to use for reference during maintenance; its nacelle inch-station number is 200. The canted bulkhead at nacelle station 80 and the vertical firewall at nacelle station 161 are also good physical locations. Other component locations can be determined by measuring either forward or aft from these points. The lowest surface of the inboard pods at the centerline, is waterline -17.0; the lowest point of the outboard pods is at waterline 4.0. See Figure 6 for example of locating pod and pylon stations.

D. Horizontal Stabilizer Station Lines.

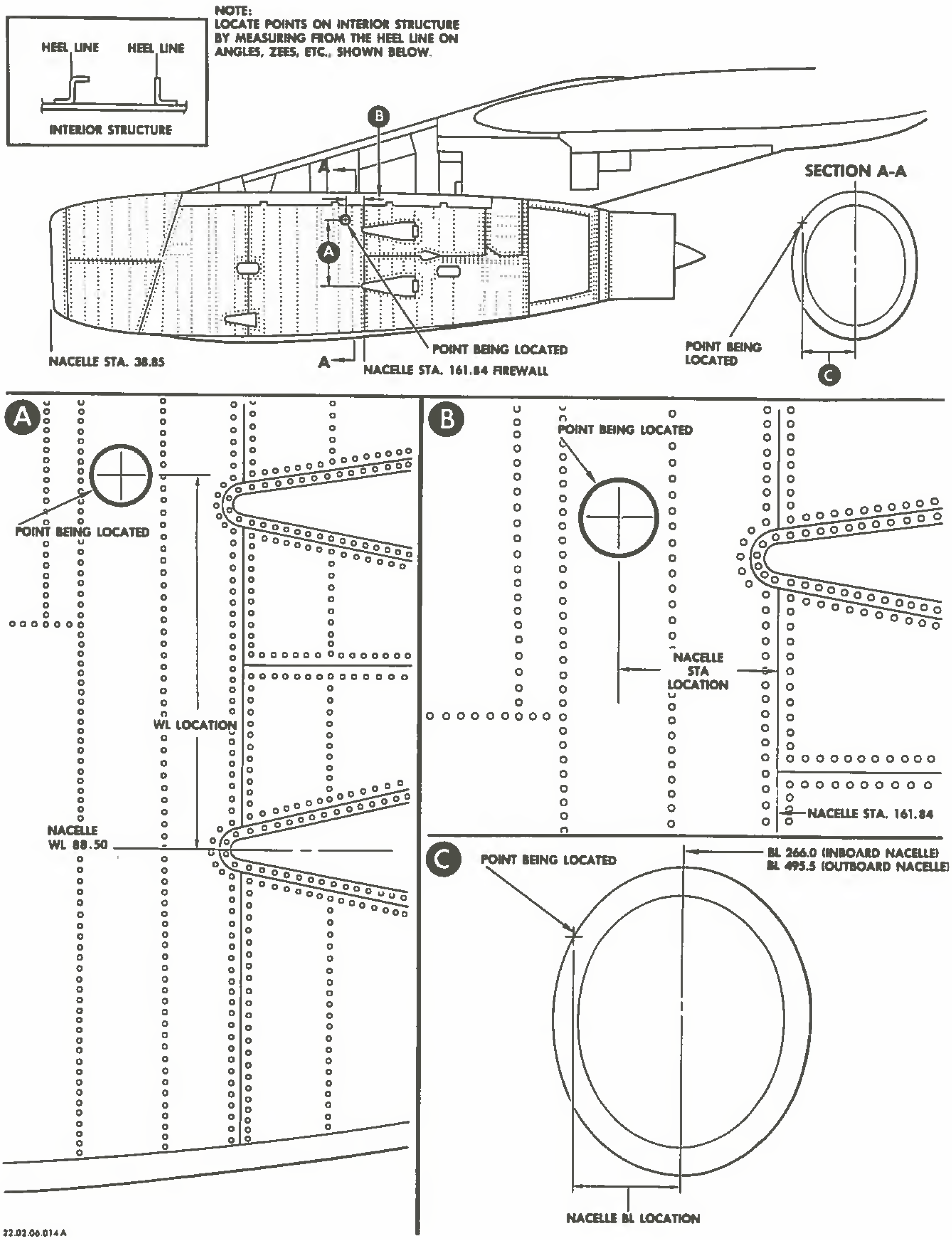
The horizontal stabilizer, elevator, and elevator flight tab station lines are measured along individual axes, as explained in the following paragraphs and shown on Figure 7. Figure 8 shows an example method for locating a specific point on the horizontal stabilizer.

Stabilizer leading edge stations are measured from a zero reference point at the intersection of the 10 percent chord line and centerline of airplane at fuselage station 1411.7, perpendicular to the 10 percent chord line.

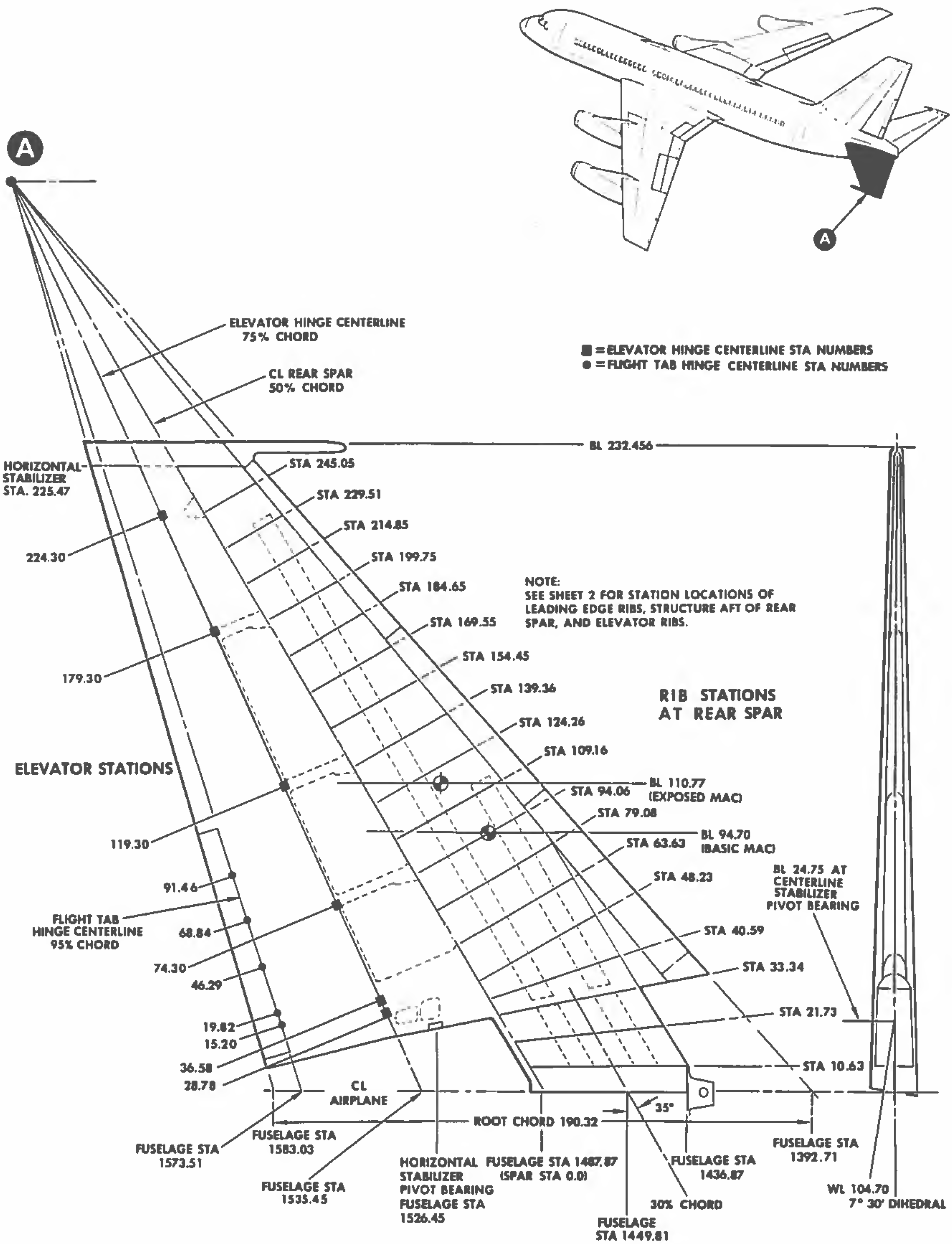
Interspar rib stations are measured from two different reference points. The forward ends of the interspar ribs inboard of station 48 are measured from a zero reference point at the intersection of front spar centerline and BL 9.1 at fuselage station 1436. The aft ends of the



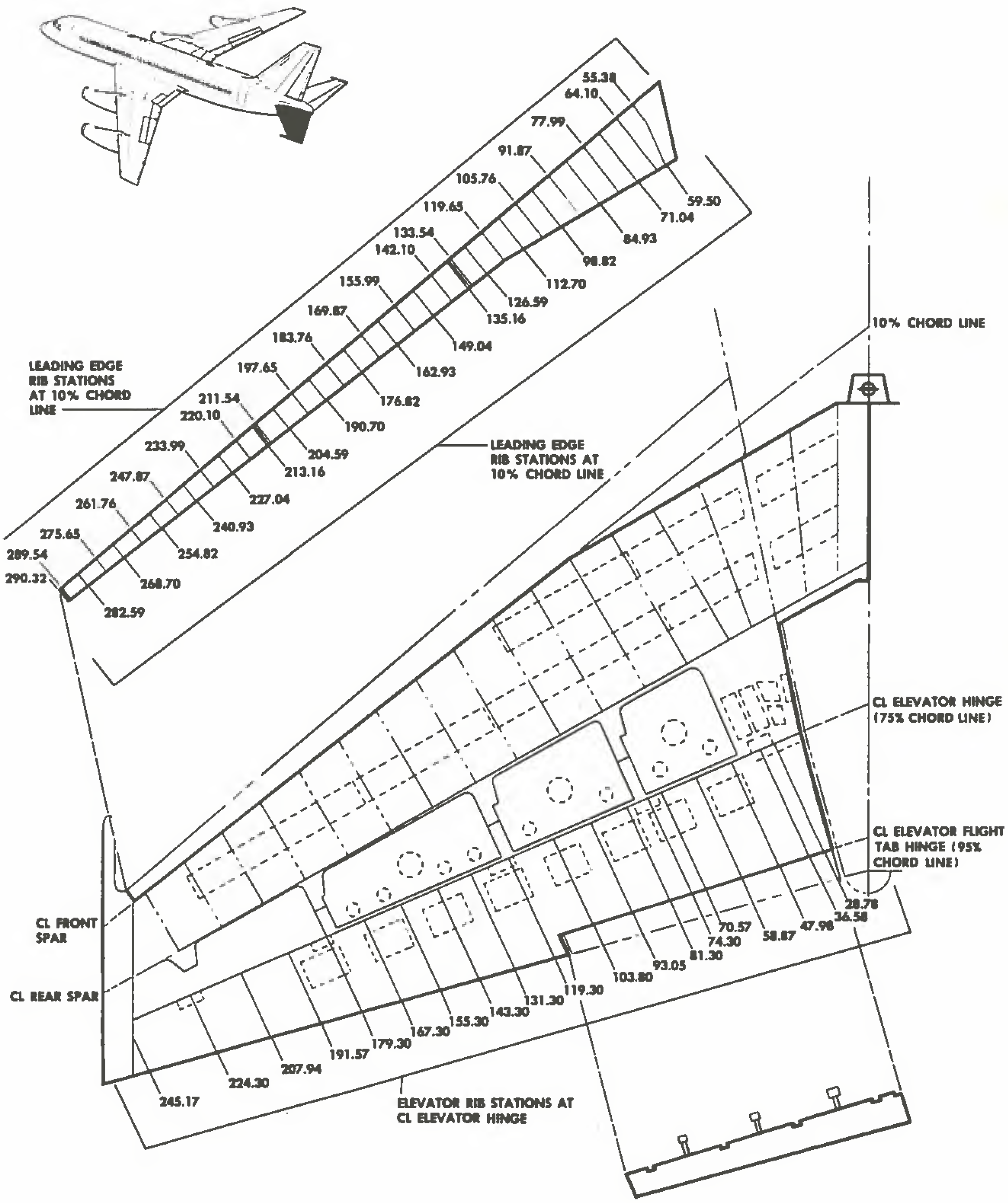
Pod and Pylon Station Diagram
Figure 5



Pod and Pylon Station Location (Example)
Figure 6



Horizontal Stabilizer
Station Diagram (Sheet 1 of 2)
Figure 7



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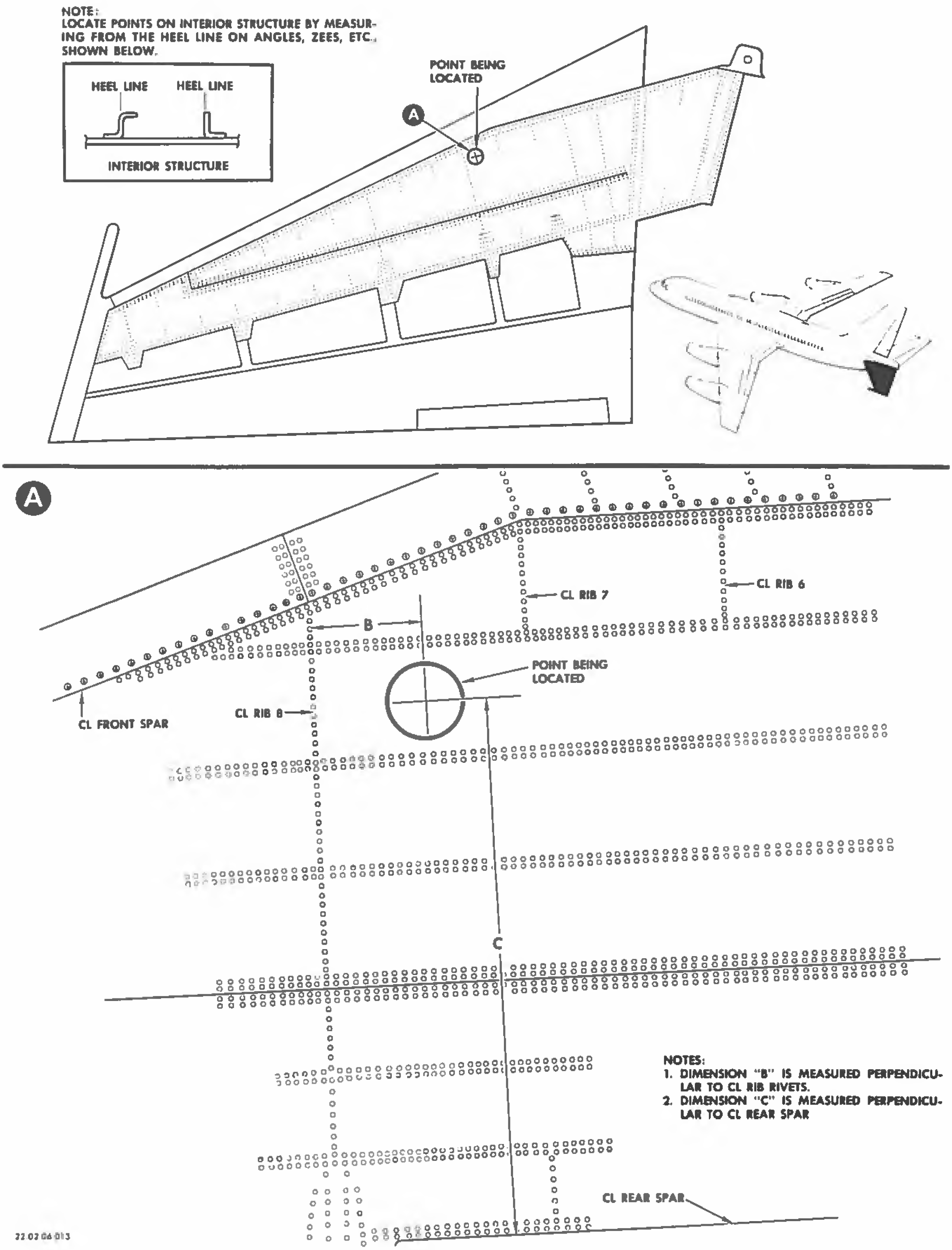
Horizontal Stabilizer
Station Diagram (Sheet 2 of 2)
Figure 7



Horizontal Stabilizer
Station Location (Example)
Figure 8

interspar ribs inboard of station 48, and the interspar ribs from station 48 to the tip are measured from a zero reference point at intersection of the rear spar centerline and centerline of the airplane at fuselage station 1487. The interspar ribs inboard of station 48 are positioned at varying degrees of arc in reference to the rear spar; see Figure 7. The interspar ribs between station 48 and the tip are perpendicular to the rear spar.

Elevator stations are measured from a zero reference point at intersection of elevator hinge centerline and centerline of the airplane at fuselage station 1535.4, perpendicular to the elevator leading edge or hinge line. Elevator hinge locations are shown on Figure 7 as reference points.

Elevator flight tab stations are perpendicular to the tab leading edge. These stations are measured from a zero reference point at the intersection of the tab hinge line and centerline of airplane at fuselage station 1573.5. Tab hinge stations are shown on Figure 7 as reference points.

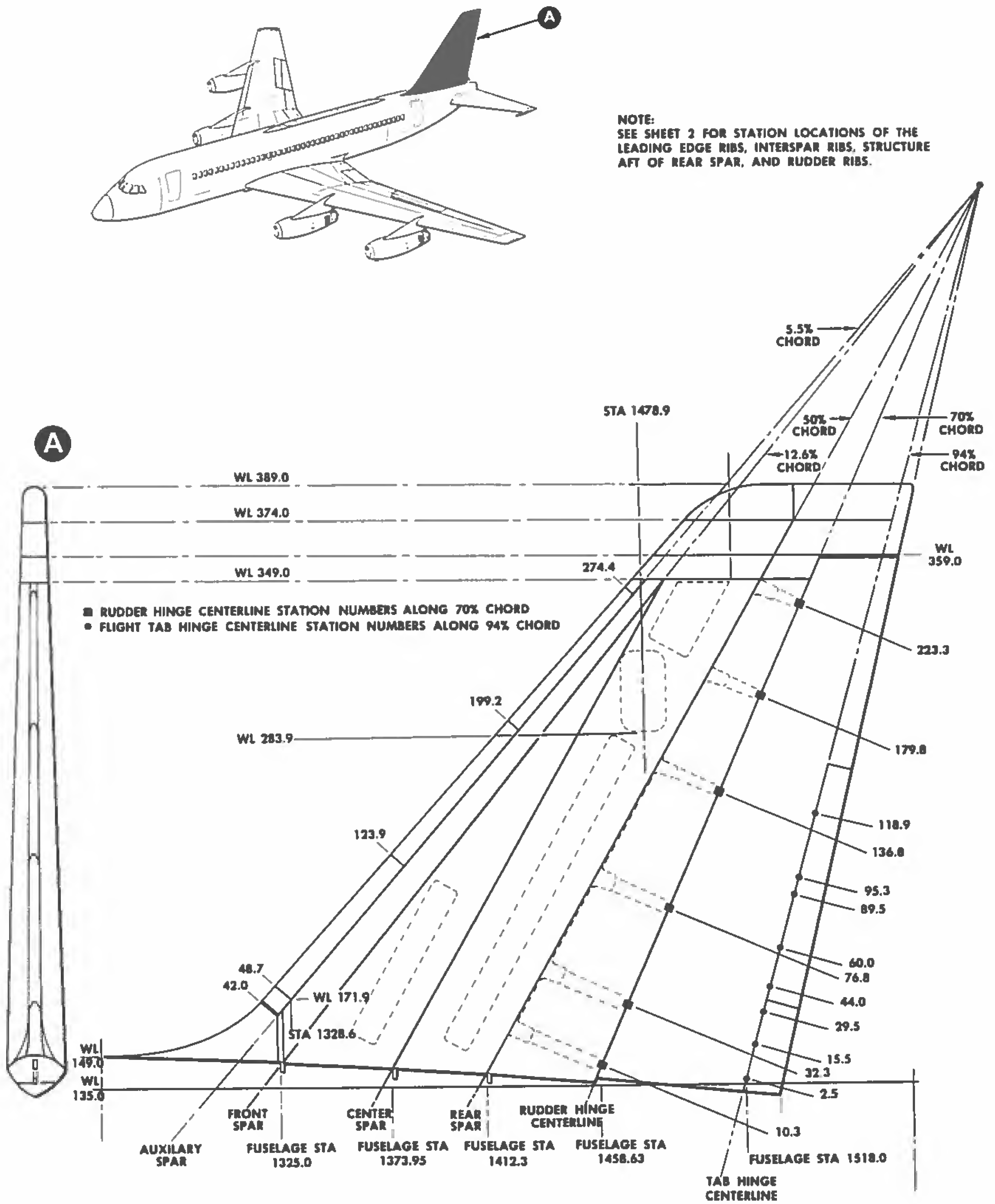
E. Vertical Stabilizer Station Lines.

The vertical stabilizer, rudder, and rudder flight tab and trim tab station lines are measured from zero reference points along individual axes, as shown on Figure 9. In addition to these station lines, waterlines and fuselage station lines can be used for locating and installing equipment. Figure 10 shows an example method for locating a specific point on the vertical stabilizer.

Leading edge rib stations are located perpendicular to the auxiliary spar. These stations are measured from a zero reference point at intersection of auxiliary spar centerline and centerline of the airplane at fuselage station 1296.8.

Vertical stabilizer interspar ribs are located from two different reference points. Interspar ribs between the front spar and auxiliary spar are measured from a zero reference point at intersection of front spar centerline at WL 135 and centerline of airplane at fuselage station 1314.6. These ribs are perpendicular to the front spar. The vertical stabilizer interspar ribs between the center and rear spar are measured from a zero reference point at intersection of the rear spar centerline at WL 135 and centerline of airplane at fuselage station 1408.45. These ribs are perpendicular to the rear spar.

Rudder support ribs between the vertical stabilizer rear spar and rudder hinge centerline are measured from a zero reference point at intersection of rudder hinge centerline at WL 135 and centerline of airplane at fuselage station 1458.6. These ribs are perpendicular to the rudder leading edge or hinge centerline.



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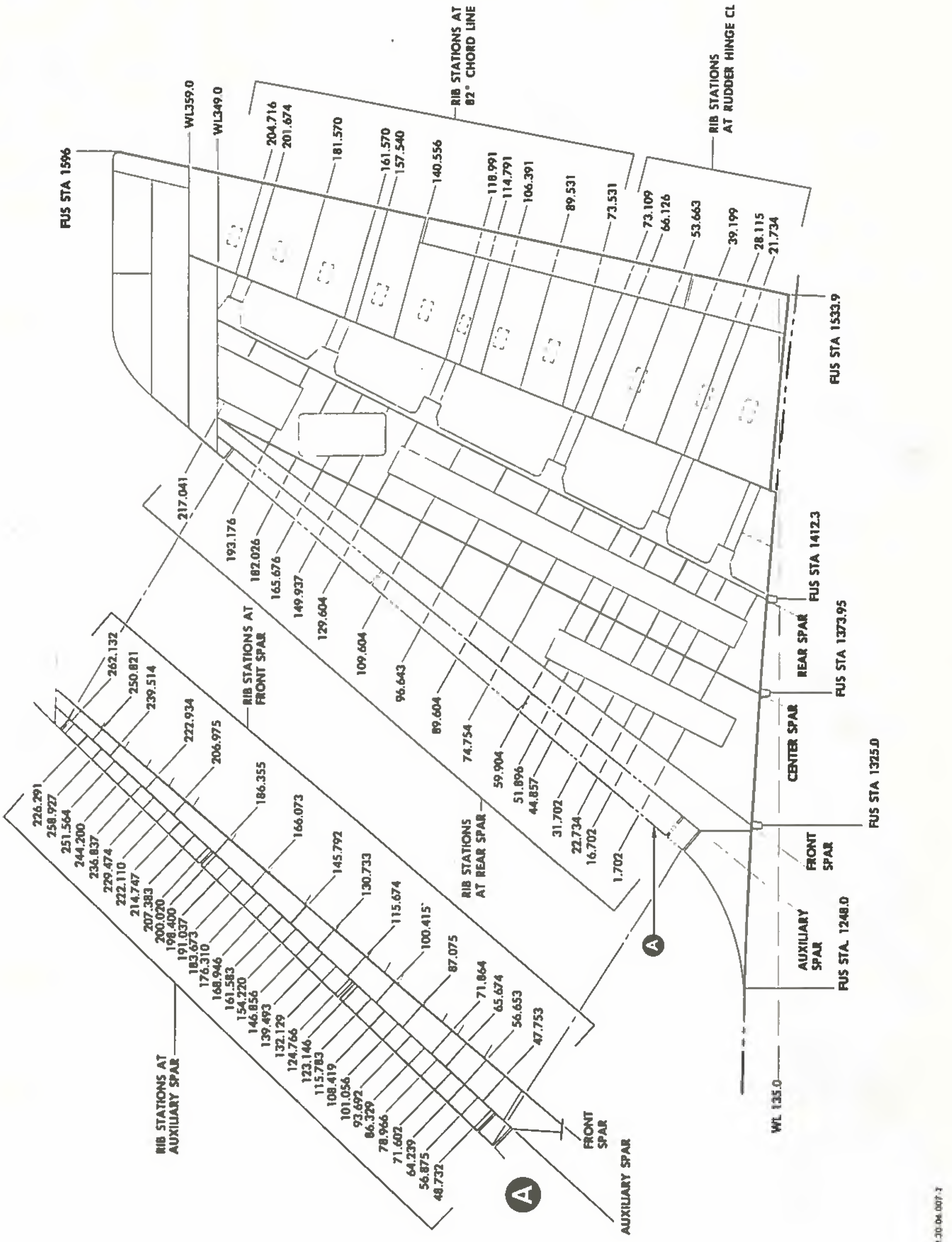
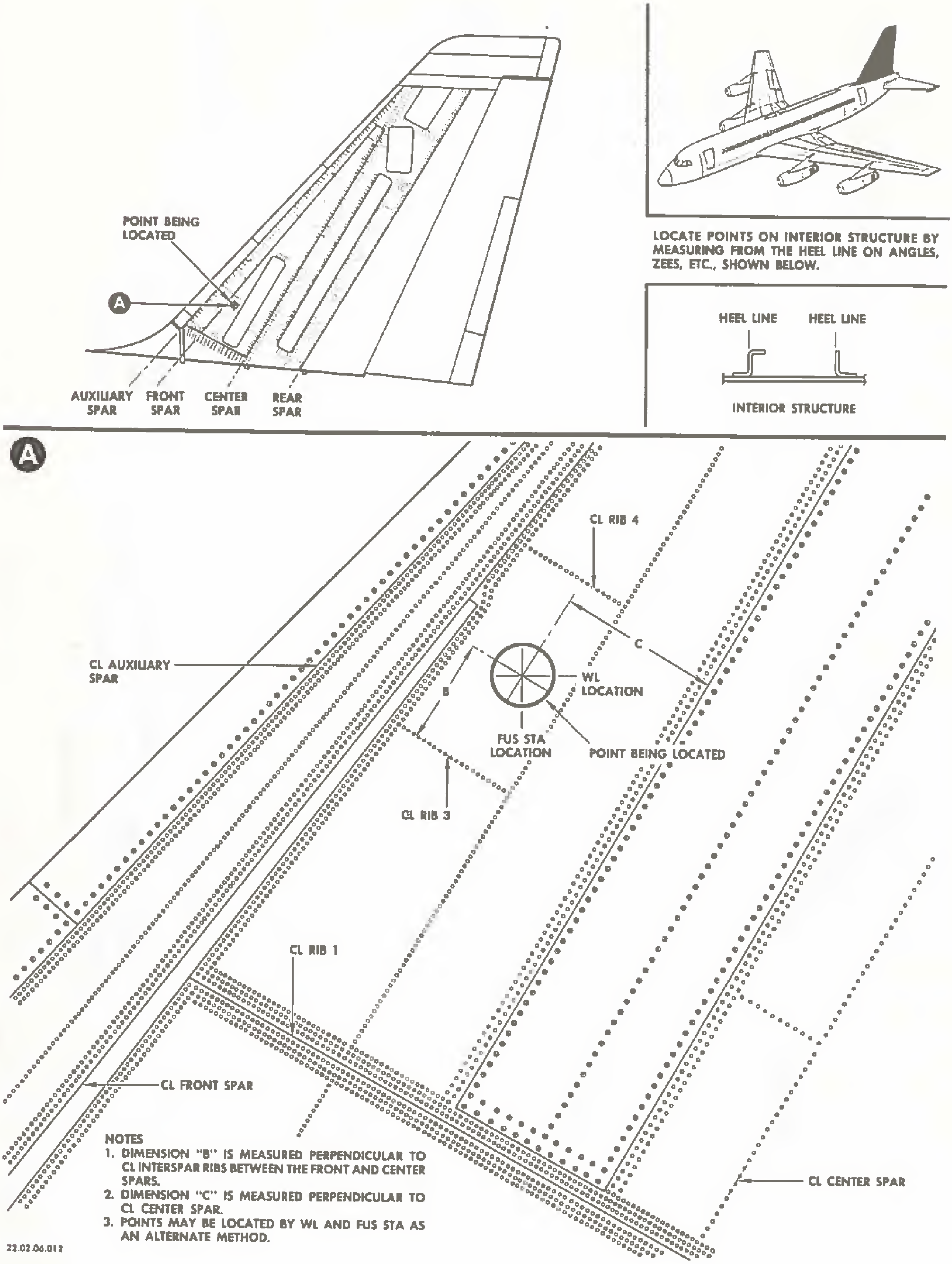
Vertical Stabilizer
Station Diagram (Sheet 1 of 2)
Figure 9



Vertical Stabilizer
Station Diagram (Sheet 2 of 2)
Figure 9



Vertical Stabilizer
Station Location (Example)
Figure 10

Rudder hinge stations are measured from a zero reference point at the intersection of the rudder hinge centerline at WL 135 and fuselage station 1458.6, perpendicular to the rudder hinge line. The rudder hinge locations are shown on Figure 9 as reference points.

Rudder rib stations below station 73.5 are measured from a zero reference point at intersection of the 82 percent chord line at WL 135 and centerline of airplane at fuselage station 1483.4. Rudder rib stations above station 73.1 are measured from a zero reference point at the intersection of the flight tab and trim tab hinge centerline at WL 135 and centerline of airplane at fuselage station 1518.0, perpendicular to flight and trim tab hinge centerline.

Rudder flight and trim tab stations are measured from a zero reference point at the intersection of the flight and trim tab hinge line at WL 135 and fuselage station 1418, perpendicular to the leading edge of hinge line of the tabs. The tab hinge locations are shown on Figure 9 as reference points.

3. Water Lines

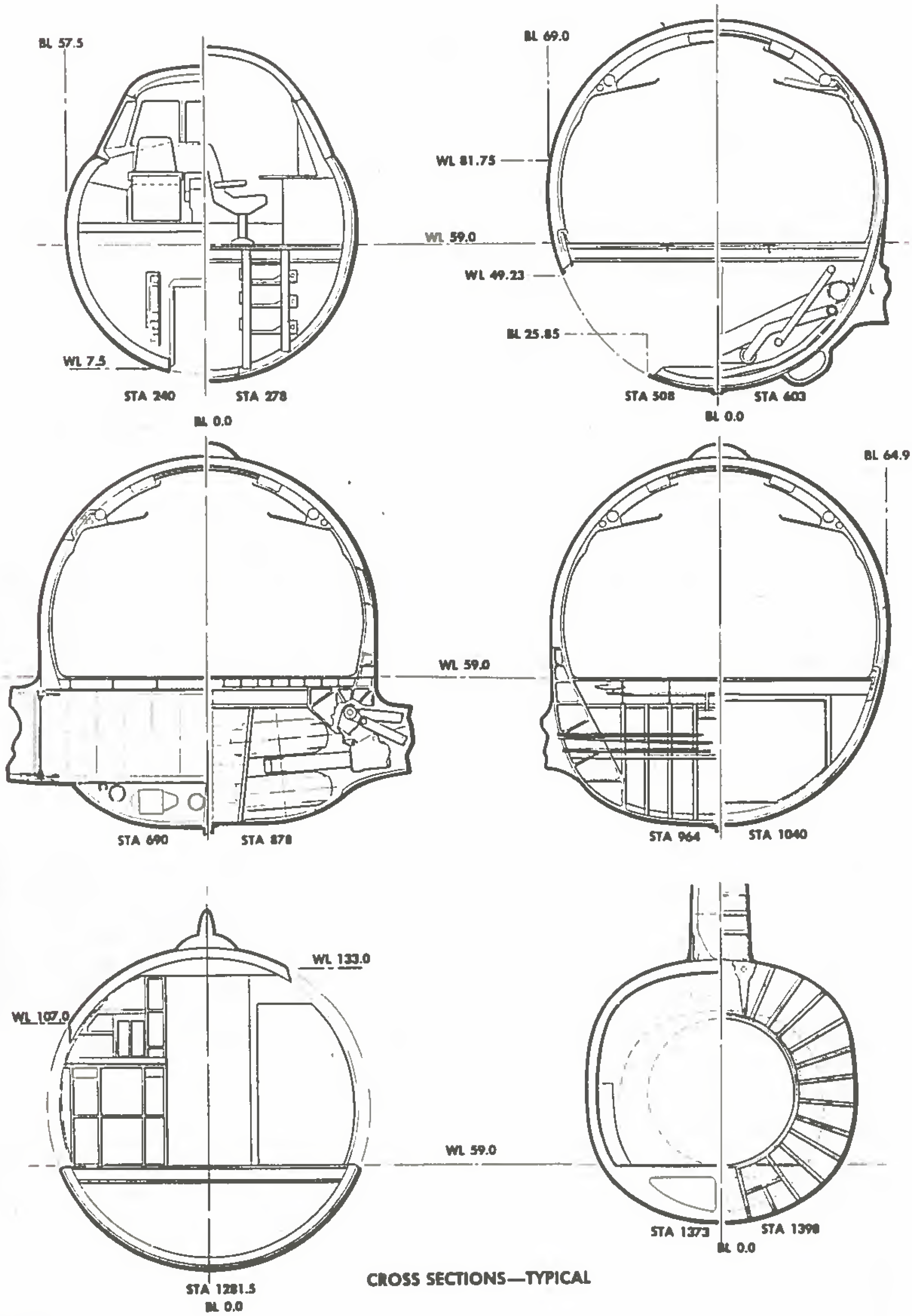
Water lines (WL) are horizontal reference lines measured vertically in inches from the inside surface of the lower fuselage skin at the airplane centerline. This inside surface of the lower fuselage skin is at WL 0.0; all water lines below this point are negative or minus water lines. Several easy water lines to remember are: WL 0.0 at the bottom of the fuselage centerline, the top surface of the cabin floor at WL 59, and the six fuselage leveling rivets on the outside surface of the fuselage (left and right sides) at WL 68. Figures 1 and 11 show some typical water line locations in the fuselage.

4. Buttock Lines

Buttock lines (BL) are reference lines along the lateral or Y axis and are measured perpendicularly in inches to the right and left of the fuselage centerline, as shown on Figure 11. The fuselage centerline is at BL 0.0, while the inside surface of the fuselage skin at the widest point in the fuselage (WL 81.75) is at BL 69. Buttock lines may be used as reference lines in the wings and horizontal stabilizer, and extend perpendicularly, without regard to dihedral, to the right and left of the fuselage centerline; the extreme ends of the wing tips, when measured perpendicularly from BL 0.0, are at BL 720.00.

5. Dimensions

The principal dimensions of the airplane are shown on Figure 12 and are listed on the following pages along with other pertinent data.



CROSS SECTIONS—TYPICAL

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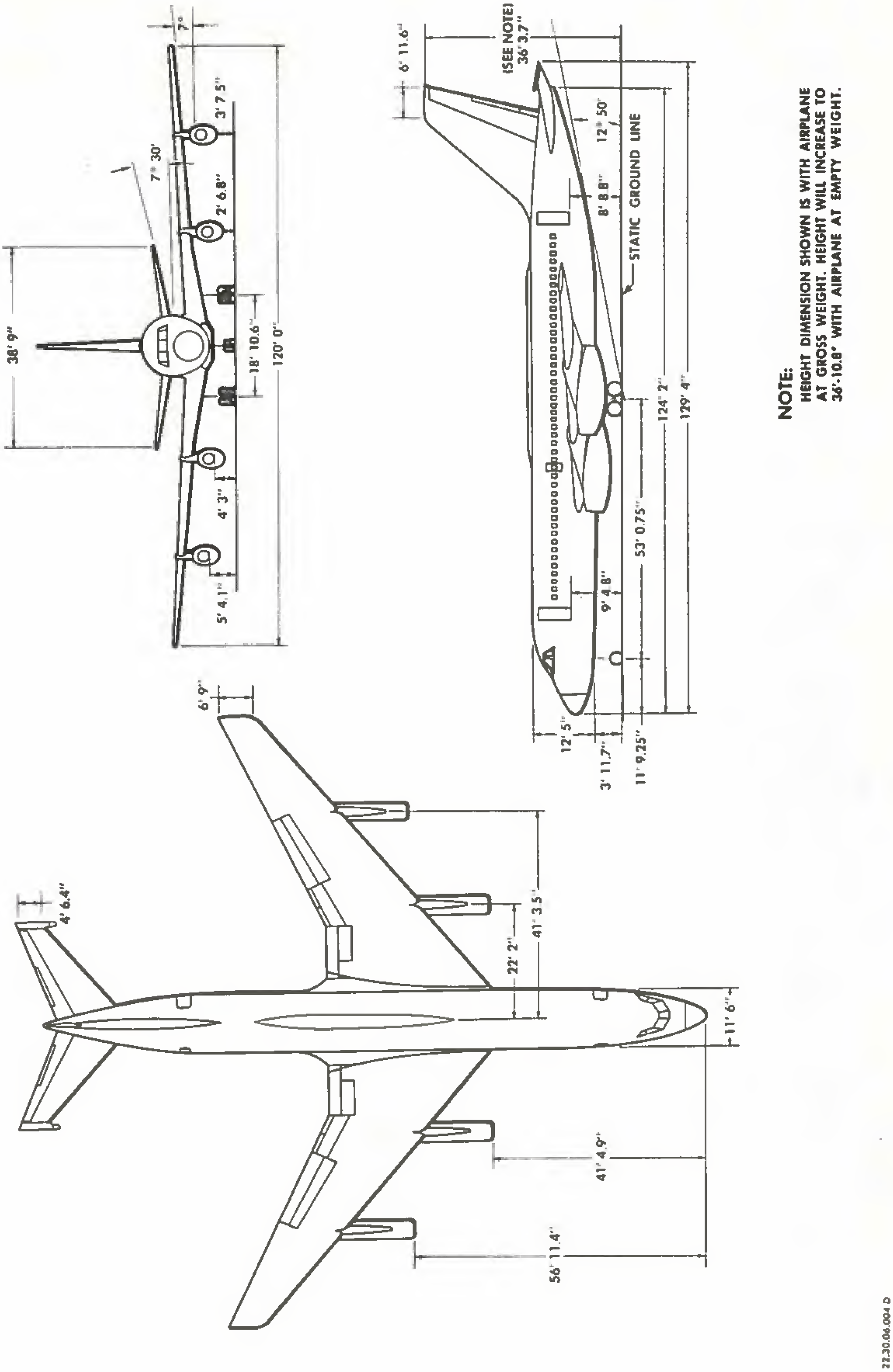
Fuselage Cross Section - Typical
Figure 11



Airplane Three-View
Figure 12

Wing

Span	120 feet
Airfoil Section	
Root (Extended Chord)	NACA 0011-64 modified
31.5% Semi-Span (Break)	NACA 009.08-64 modified
Tip	NACA 0008-64 modified
Chord at Root	35 feet 8.4 inches
Chord at Tip	6 feet 9 inches
Mean Aerodynamic Chord (MAC)	18 feet 11.3 inches
Aspect Ratio	7
Sweepback (At wing 30% chord line)	35 degrees
Incidence (Root)	2 degrees
Dihedral (At manufacturing chord plane)	7 degrees
Flaps (Type)	Double Slotted
Ailerons	11 feet 1.6 inches
Engine Pod Clearance (Three-Point Position)	
Inboard Pod	2 feet 6.8 inches
Outboard Pod	3 feet 7.5 inches

Horizontal Stabilizer

Span	38 feet 8.9 inches
Airfoil Section	
Root	NACA 009.5-64 modified
Tip	NACA 0008-64 modified
Mean Aerodynamic Chord (basic)	11 feet 2.9 inches
Mean Aerodynamic Chord (exposed)	9 feet 10.3 inches
Aspect Ratio	3.80
Taper Ratio	0.285
Sweepback (At 30% chord line)	35 degrees
Incidence (adjustable)	
Down	14 degrees
Dihedral	7.5 degrees

Vertical Stabilizer

Height (Top of Tip Above Ground)	36 feet 3.7 inches
Airfoil Section	
Root	NACA 00010-64 modified
Tip	NACA 0008-64 modified
Aspect Ratio	1.52
Taper Ratio	0.33
Sweepback (At 30% chord line)	35 degrees

Fuselage

Length (Overall)	124 feet 2 inches
Height (Maximum)	12 feet 5 inches

Fuselage (cont.)

Width (Maximum)	11 feet 6 inches
Doors	
Entrance (2)	30 x 74 inches
Service (2)	24 x 48 inches
Cargo (2)	34 x 39 inches
Emergency (2)	20 x 36 inches

Landing Gear

Wheel Base	53 feet 0.75 inches
Tread (Main Gears)	18 feet 10.6 inches
Tread (Main Gear Tires)	
Longitudinal Centerline	45 inches
Spanwise Centerline	21.5 inches
Tread (Nose Gear Tires)	17 inches
Nose Tire Centerline to Station 100	11 feet 9.2 inches

6. Areas

Wing (Total)	2000 square feet
Vertical Stabilizer (Total)	295 square feet
Rudder (Aft of Hinge Line, Including Tabs)	82.4 square feet
Rudder Balance	45.3 square feet
Flight Tab (Aft of Hinge)	8.2 square feet
Trim Tab (Aft of Hinge)	3.8 square feet
Horizontal Stabilizer (Total)	395 square feet
Elevator (Aft of Hinge, Including Tabs)	88.7 ~~88.3~~ square feet
Flight Tab (Aft of Hinge)	9.2 ~~8.1~~ square feet
Lower Aft Cargo Compartment	415 cubic feet
Forward Cargo Compartment	448 cubic feet

LIST OF EFFECTIVE PAGES

Chapter 7
LIFTING AND SHORING

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	BLANK		
7-0	1	Basic	A
	BLANK		
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7-1-0	2	June 5/61	A
7-1-0	3	June 5/61	A-1
7-1-0	4	June 5/61	A
7-1-0	5	June 5/61	A
7-1-0	6	June 5/61	A
7-1-0	7	June 5/61	A
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7-1-0	201	June 5/61	A-1
7-1-0	202	June 5/61	A-1
7-1-0	203	June 5/61	A
7-1-0	204	June 5/61	A
7-1-0	205	June 5/61	A
7-1-0	206	June 5/61	A
7-1-0	207	June 5/61	A
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Chapter 7
LIFTING AND SHORING

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CHAPTER 7

LIFTING AND SHORING - DESCRIPTION AND OPERATION

1. General

At various times during the maintenance and overhaul it will be necessary to lift and shore the airplane and its major components. Jacking of the airplane will be required for ground operation of the landing gear, the servicing of some of its components, and the leveling and weighing of the airplane. Jacking at the landing gear will be required for servicing of the wheels, tires and brakes, and weighing of the airplane. Shoring of the fuselage and/or the wings should be considered whenever structural repairs are made to these components.

LIFTING - DESCRIPTION AND OPERATION

1. General

Lifting the airplane consists of operations such as jacking the entire airplane, jacking at each landing gear, and raising the entire airplane with pneumatic lifting bags. Jacking provisions are incorporated in each wing and in the fuselage nose for jacking the entire airplane. Integral lugs on the main and nose landing gears provide jacking points for individual gear jacking. Although infrequently used, pneumatic lifting bags provide a means of raising the airplane following a wheels-up landing, or supporting the airplane under unusual circumstances. The airplane must not be jacked in winds exceeding 35 knots. Precautions such as removing all unnecessary equipment in the area and checking overhead clearances must be observed.

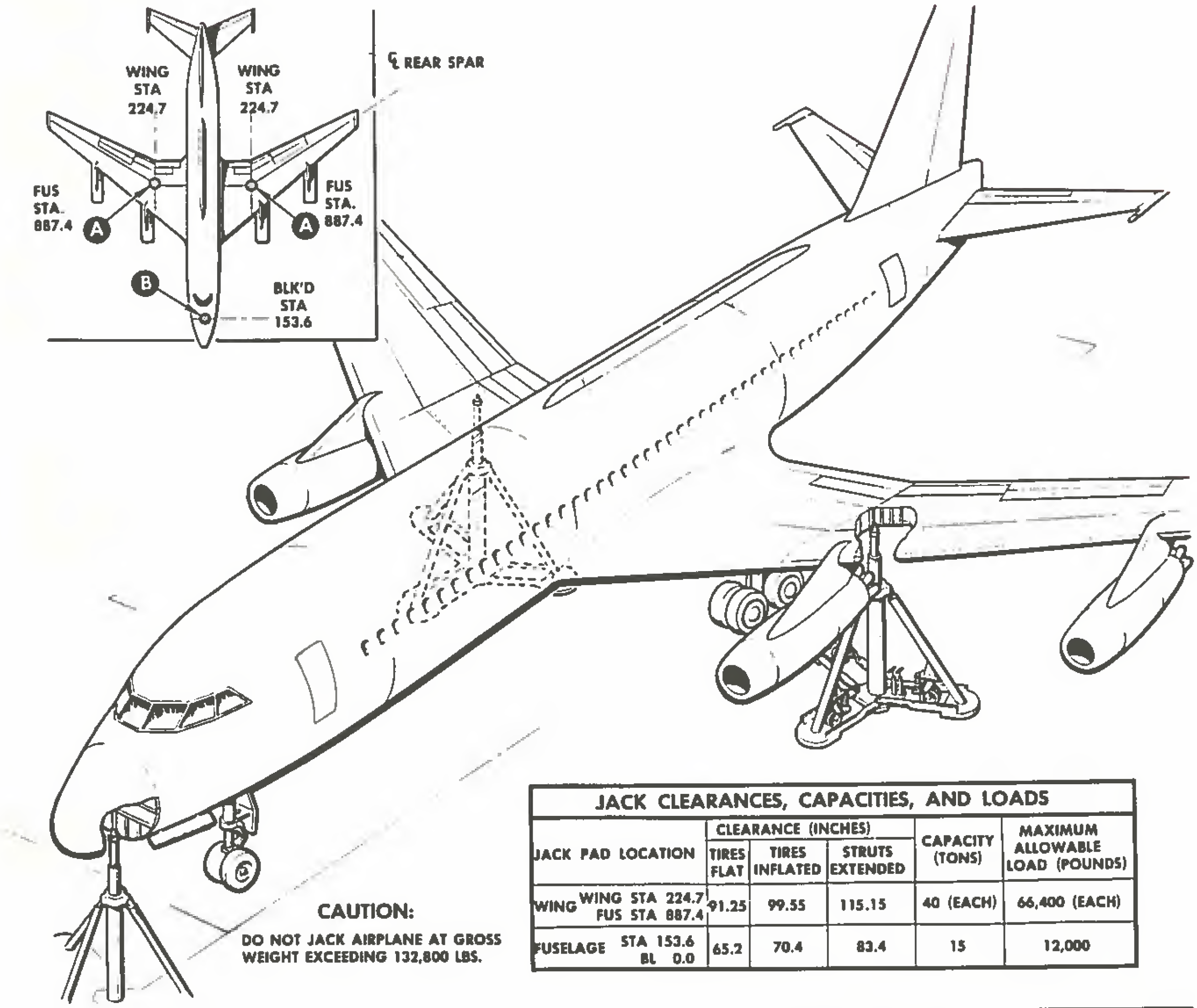
2. Jacking the Entire Airplane

The entire airplane is raised using the three airplane structural jack points shown on Figure 1. The fuselage jack point is at fuselage station 153.6, forward of the nose landing gear wheel well; the two wing jack points are on wing station 224.7, four inches aft of the rear spar, even with fuselage station 887.4. When not in use, the jack fitting openings are filled with flush inserts to maintain aerodynamic smoothness. Jacking operations should be simultaneous to keep the airplane in a level attitude; this is to minimize side loads and to prevent jack overloading.

A restraining clamp may be used on each landing gear strut to prevent the strut from extending while the airplane is being raised. When restraining clamps are used the landing gear struts must be deflated. These clamps will not support the weight of the landing gear in addition to the tension applied against the clamps by the inflated struts.

3. Jacking at the Landing Gears

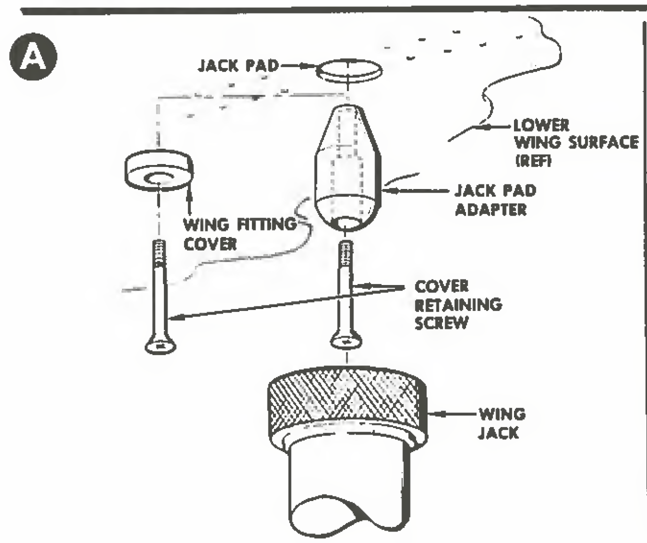
Three integral lugs are incorporated on each main landing gear truck, one below the truck pivot on the strut centerline, and one below each wheel axle centerline. The jacking lug on the nose landing gear is ten inches forward of the nose wheel axle centerline. These seven jack points enable the gears and/or the wheels to be raised individually for servicing. Downlock safety pins must be installed in the side braces of the main landing gears and in the drag brace of the nose landing gear to prevent them from inadvertently retracting. Main landing gear wheel or brake servicing is made possible by raising the front or rear of the main gear trucks with jacks under the integral pads as shown on Figure 2. A jacking tool that may be used when four main landing gear tires are flat is shown on Figure 3. The jacking limit dimensions shown on Figure 4 must not be exceeded when jacking at the main landing gear. When jacking under any landing gear, lift the gear only high enough to clear the tires from the ground.

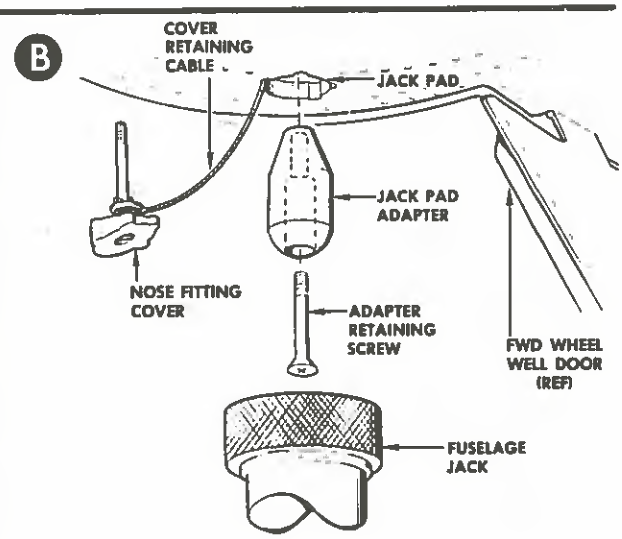


JACK CLEARANCES, CAPACITIES, AND LOADS					
JACK PAD LOCATION	CLEARANCE (INCHES)			CAPACITY (TONS)	MAXIMUM ALLOWABLE LOAD (POUNDS)
	TIRES FLAT	TIRES INFLATED	STRUTS EXTENDED		
WING — WING STA 224.7, FUS STA 887.4	91.25	99.55	115.15	40 (EACH)	66,400 (EACH)
FUSELAGE — STA 153.6, BL 0.0	65.2	70.4	83.4	15	12,000

CAUTION:

DO NOT JACK AIRPLANE AT GROSS WEIGHT EXCEEDING 132,800 LBS.





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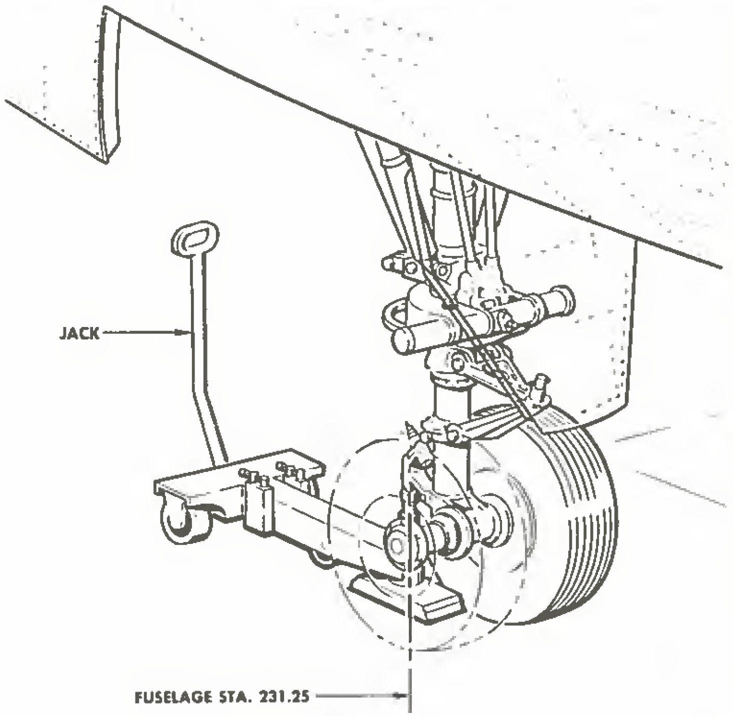
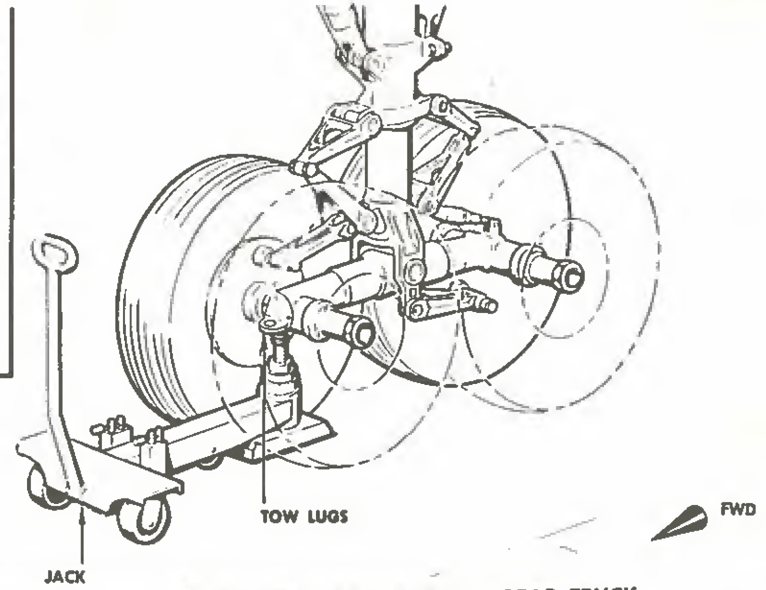
Fuselage and Wing Jack Points
Figure 1

LANDING GEAR JACK POINT LOCATION		CLEARANCE (INCHES)					CAPACITY (TONS)	MAXIMUM ALLOWABLE LOAD (POUNDS)
		TIRES INFLATED	2 FLAT TIRES	4 FLAT TIRES	4 TIRES REMOVED	2 TIRES REMOVED		
MAIN LANDING GEAR STRUT		11.63	9.26 9.22	7.10	5.10	8.40 8.32	50 (EACH)	86,700 (EACH)
MAIN LANDING GEAR TRUCK	FOR-WARD	12.53	7.80 12.56	8.00	6.00	6.00 12.60	25 (EACH)	45,200 (EACH)
	AFT	11.90	12.10 6.96	7.38	5.38	12.18 5.04	25 (EACH)	41,500 (EACH)
NOSE LANDING GEAR STRUT		13.90	12.20			10.20	25	15,000

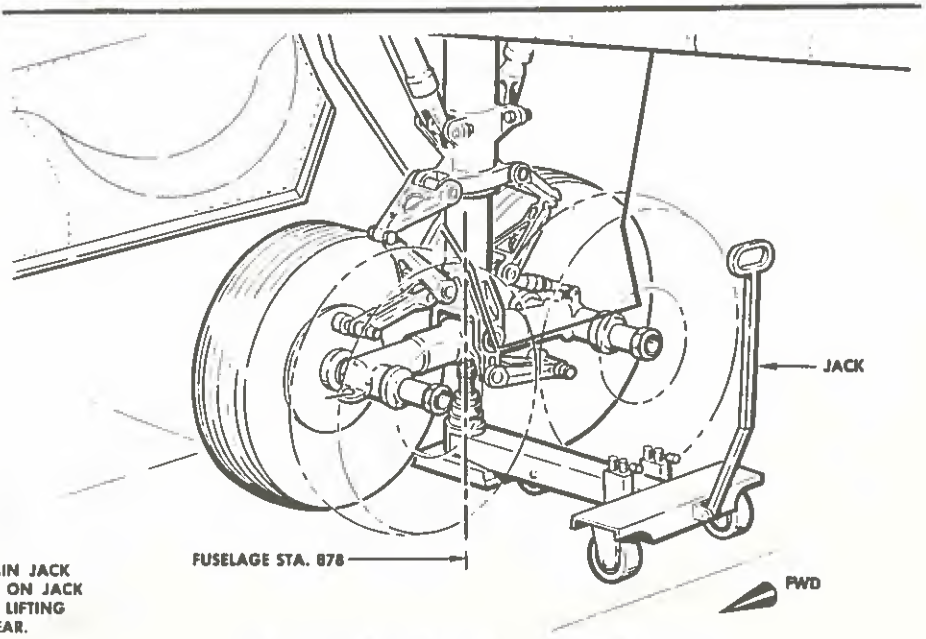
Table title: JACK CLEARANCES, CAPACITIES, AND LOADS



JACKING AT NOSE LANDING GEAR



JACKING AT MAIN LANDING GEAR TRUCK



JACKING AT MAIN LANDING GEAR STRUT

CAUTION:
MAKE CERTAIN JACK IS CENTERED ON JACK PAD BEFORE LIFTING LANDING GEAR.

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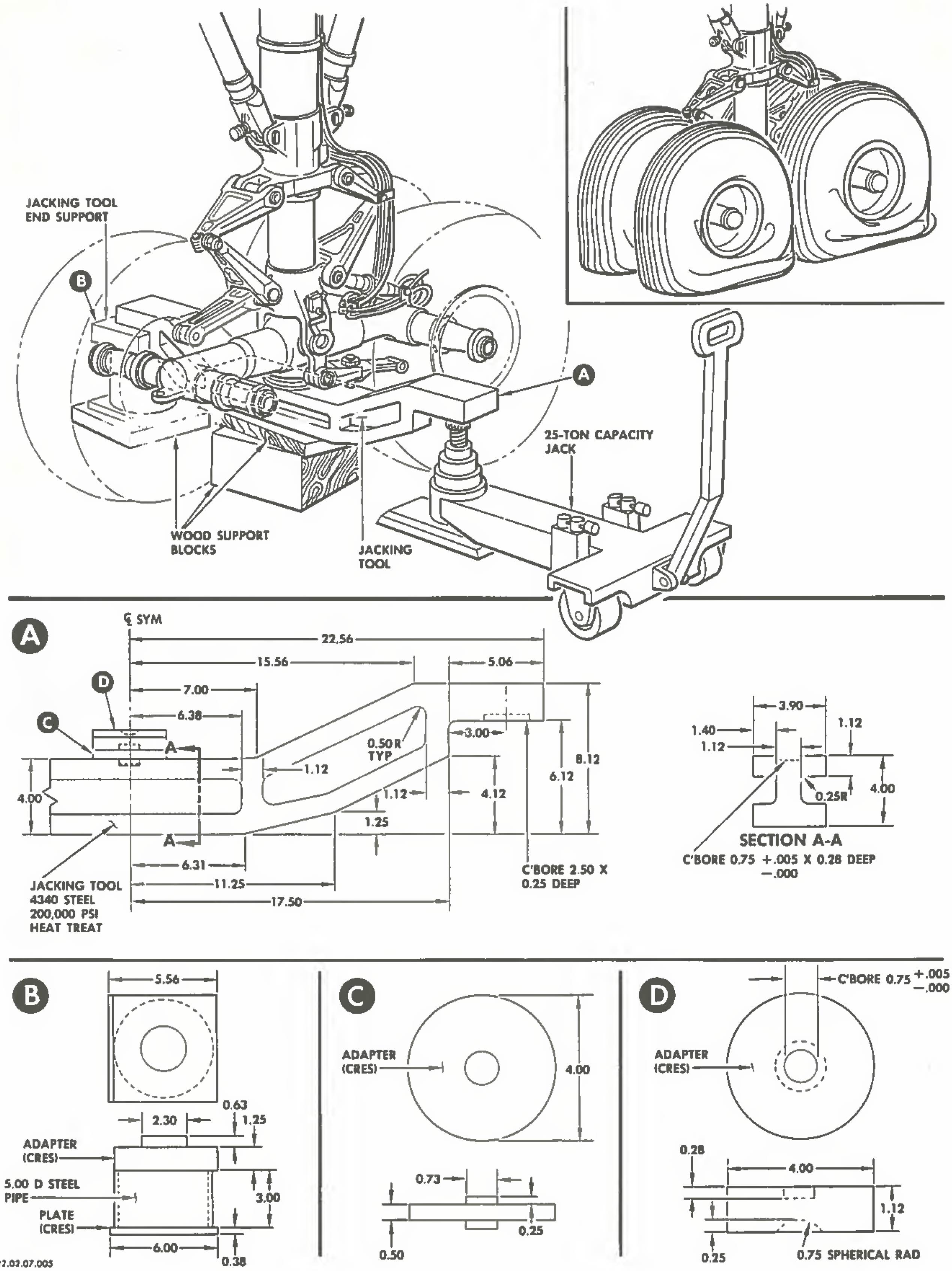
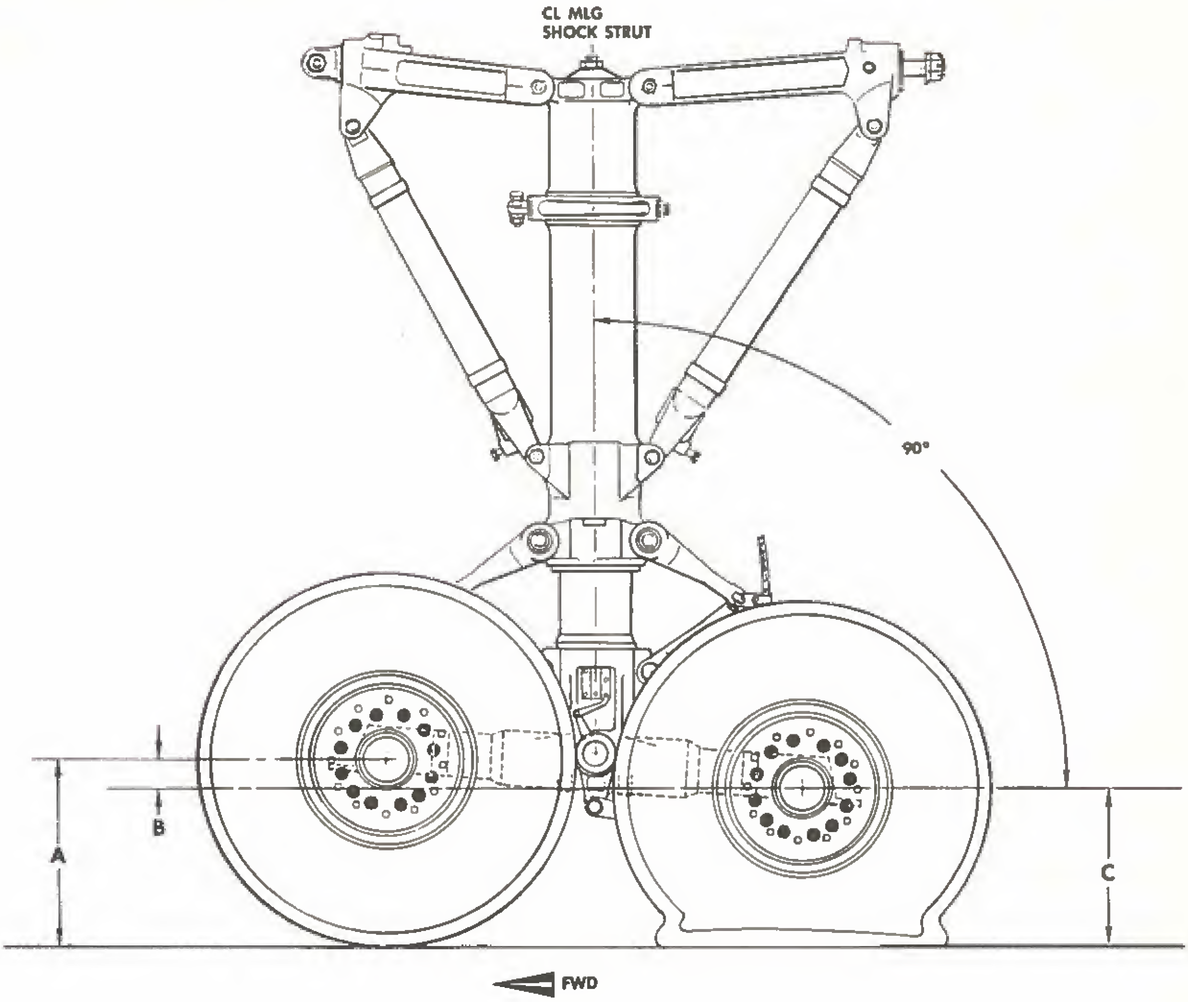
Landing Gear Jack Points
Figure 2



Main Landing Gear Jacking Tool (4 tires flat)
Figure 3



MAIN LANDING GEAR TRUCK BEAM JACKING LIMIT DIMENSIONS AT FWD AND AFT JACK PADS

DIM.	4 FLAT TIRES	NO TIRES (WHEEL RIMS ON GROUND)	2 TIRES INFLATED SAME AXLE— 2 TIRES FLAT SAME AXLE— JACK AT FLAT TIRE END
"A"	FWD = 16.88	FWD = 14.88	FWD = 21.40
"B"	FWD = 5.48	FWD = 5.48	FWD = 5.48
	AFT = 10.00	AFT = 10.00	AFT = 10.00
"C"	AFT = 21.40	AFT = 19.40	AFT 24.92

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Main Landing Gear Jacking Limits
Figure 4

4. Jacking at a Main Landing Gear When Four Tires Are Flat

A special jacking tool may be made to raise the main landing gear, as shown on Figure 3, when all four tires are flat on one main gear. The down-lock safety pins must be installed in all landing gears. The special jacking tool is inserted between the forward and aft tires and is positioned under the jack pad on the centerline of the main strut. A 25-ton capacity jack is placed under one end of the tool and a support block is placed under the other end. Raising the landing gear is accomplished by jacking at the one end of the tool until a support block can be placed under the center of the tool; then building up the height of the end support block and repeating the procedure until the landing gear has been raised high enough to replace the four flat tires.

5. Lifting Clearances

A. Wing and Fuselage Jack Clearances.

Clearances between the wing and fuselage jack pads and the surfaces upon which jacks are placed are tabulated on Figure 1 for various conditions.

B. Landing Gear Jack Clearances.

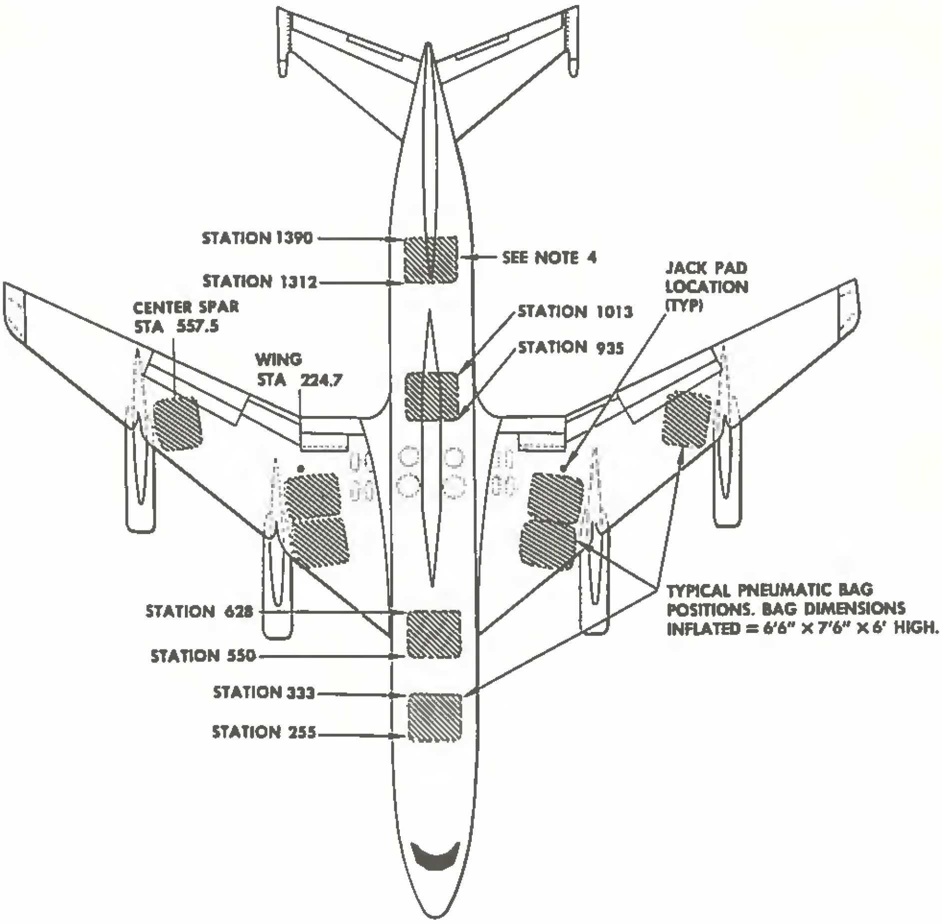
Clearances between the landing gear jack pads and the surfaces upon which jacks are placed are tabulated on Figure 2 for various conditions.

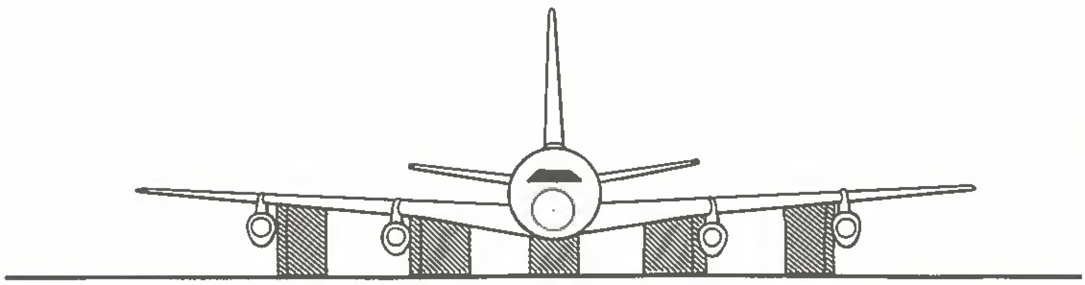
6. Lifting Airplane with Pneumatic Bags

If conditions prohibit normal lifting procedures during emergencies, the airplane can be raised with pneumatic bags as shown on Figure 5. Type F-2 lifting bags, manufactured by the U.S. Rubber Company (or equivalent), may be used to raise the airplane enough for it to be shored, or for it to be supported by the landing gears or by airplane jacks. These bags may be inflated to a height of six feet; they have a unit lifting capacity of 12 tons. If necessary, the bags may be stacked and laced together, and manifolded to receive air simultaneously. Each lifting bag has a protective tarpaulin cover for storage.

Lifting procedures may differ depending upon the extent of airplane damage, the wind conditions, and the terrain. The airplane should be lightened as much as possible by removing all loose equipment and baggage, and if possible, it should be defueled. The under side of the airplane should be examined for sharp or rough projections which could puncture the bags. Felt pads and the storage covers may be used to provide additional bag protection.

When it has been lifted to a sufficient height, shoring or jacks should be used to support the airplane. In some cases, it may be possible to extend and lock the landing gears. The lifting bags should not be used to support the airplane in lieu of standard equipment designed for the purpose.





NOTES:

1. AIRPLANE WEIGHT MUST BE REDUCED TO ABSOLUTE MINIMUM. MAXIMUM LOAD PERMISSIBLE ON EACH BAG = 24,000 LBS.
2. BAGS CENTRALLY LOCATED UNDER WING SPLICE AREA ALLOWING CLEARANCE FOR PLACING JACKING EQUIPMENT AT STRUCTURAL JACK POINTS.
3. BAG CENTRALLY LOCATED AROUND AREA OF WING SKIN SPLICE (APPROXIMATELY 30 INCHES INBOARD OF ENGINE PYLON) AND WING CENTER SPAR.
4. EACH FUSELAGE BAG SHALL PICK UP AT LEAST FOUR FRAMES.

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Lifting Airplane With Pneumatic Bags
Figure 5

AIRPLANE JACKING - MAINTENANCE PRACTICES

1. Preparation

Before lifting the airplane it should be lightened as much as practicable by defueling, drawing the liquids from other tanks, removing unnecessary equipment, and the like. Overhead, underwing, undertail, and underbody areas should be inspected for clearances and all possible hazards that might damage the airplane should be removed.

CAUTION: DO NOT RAISE THE AIRPLANE IN WINDS EXCEEDING 35 KNOTS.

2. Jacking at the Fuselage and Wing Structural Jack Points

A. General.

The airplane is provided with three structural jack points; one near the fuselage nose and one under each wing as shown on Figure 1. The total maximum allowable gross weight for jacking at the fuselage and wing structural jack points is 132,800 pounds. The maximum load permitted at the fuselage nose jack point is 12,000 pounds. The maximum load permitted at each of the wing jack points is 66,400 pounds.

CAUTION: DO NOT JACK THE AIRPLANE IN WINDS EXCEEDING 35 KNOTS.

B. Equipment Required.

(1) Three Fuselage and Wing Jack Pad Adapters (Convair 22J112 or equivalent).

(2) Two Main Landing Gear Strut Restraining Clamps (Convair 22J123 or equivalent).

(3) One Nose Landing Gear Strut Restraining Clamp (Convair 22J124 or equivalent).

(4) One 15-Ton Hydraulic Fuselage Tripod Jack (Regent Model No. 2958 or equivalent).

(5) Two 40-Ton Hydraulic Wing Tripod Jacks (Regent Model No. 989R or equivalent).

C. Jacking Procedure.

(1) Move the airplane onto the most level hard surface available and turn its nose into the wind if in an exposed area.

CAUTION: DO NOT JACK THE AIRPLANE IN WINDS EXCEEDING 35 KNOTS.

(2) Install down-lock safety pins in all landing gears.

(3) Completely deflate nose gear strut and install restraining clamp (22J124) to prevent strut extension when airplane is raised.

(4) Completely deflate both main landing gear struts and install a restraining clamp (22J123) on each strut to prevent strut extension when the airplane is raised.

(5) Remove flush covers at the fuselage and wing jack points and install jack pad adapters (22J112) with 10-32 adapter retaining screws.

(6) Move 15-ton fuselage and 40-ton wing jacks into place under jack pad adapters. Position each wing jack with one jack leg pointing forward.

(7) Remove wheel chocks and release parking brakes.

(8) Station a man at each jack and raise the airplane in a level attitude by operating all jacks at the same time until all landing gear tires clear the ground. Refer to Chapter 8, LEVELING AND WEIGHING, for leveling procedure if exact level condition is required.

NOTE: As jacks are raised, turn down the jack ram locknuts to maintain a one-inch clearance between the nut and the ram collar. When jacking is complete, snug up the nut and tighten its setscrew.

CAUTION: DO NOT RETRACT LANDING GEAR WITH DOWN-LOCK SAFETY PINS OR STRUT RESTRAINING CLAMPS INSTALLED.

D. Lowering Procedure.

(1) Clear equipment from area under the airplane and make sure down-lock safety pins are installed in all landing gears.

(2) Loosen setscrew in jack ram locknut on each jack and turn nut up ram to provide one-inch clearance between the nut and the ram collar.

NOTE: If necessary, raise jack ram slightly to free locknut.

(3) Lower airplane in a level attitude by releasing pressure slowly on all jacks at the same time, maintaining a one-inch clearance between the locknut and the collar at each jack.

NOTE: Jack may be raised and lowered alternately to free the ram if a jack "hangs up". If ram cannot be freed, it will be necessary to raise and shore the airplane while the faulty jack is replaced. When weight is on landing gear, retract jack completely before removing.

(4) Remove jacks, jack pad adapters, and landing gear strut restraining clamps.

(5) Replace the flush covers at the fuselage and wing jack points.

(6) Reinflate the main and nose landing gear struts in accordance with the directions on the strut placard.

3. Jacking with Fuselage Jack Only

A. Equipment Required.

(1) One Fuselage Jack Pad Adapter (Convair 22J112 or equivalent).

(2) One Nose Landing Gear Strut Restraining Clamp (Convair 22J124 or equivalent).

(3) One 15-Ton Hydraulic Fuselage Tripod Jack (Regent Model No. 2958 or equivalent).

B. Jacking Procedure.

(1) Move the airplane onto the most level hard surface available and turn its nose into the wind if in an exposed area.

CAUTION: DO NOT JACK AIRPLANE IN WINDS EXCEEDING 35 KNOTS.

(2) Install down-lock safety pins in all landing gears.

(3) Position wheel chocks firmly on the aft side of each main landing gear truck and loosely on the forward side.

(4) Completely deflate the nose gear strut and install restraining clamp (22J124) to prevent strut extension when airplane is raised.

NOTE: Omit this step if the nose is being raised for replacement of nose gear strut O-rings or for gear operation.

(5) Remove the flush cover at the fuselage jack point and install jack pad adapter (22J112) with a 10-32 adapter retaining screw.

(6) Move 15-ton fuselage jack into place under the jack pad adapter.

(7) Release the parking brakes.

(8) Raise the fuselage nose. As the jack is raised, turn down the jack ram locknut to maintain a one-inch clearance between the nut and the ram collar. When jacking is complete, snug up the nut and tighten its setscrew.

C. Lowering Procedure.

(1) Clear equipment from area under the fuselage nose and make sure down-lock safety pins are installed in all landing gears.

(2) Loosen setscrew in jack ram locknut on jack and turn nut up ram to provide one-inch clearance between the nut and the ram collar.

NOTE: If necessary, raise jack ram slightly to free locknut.

(3) Lower fuselage nose, maintaining a one-inch clearance between the locknut and the collar.

NOTE: Jack may be raised and lowered alternately to free the ram if the jack "hangs up." If ram cannot be freed, it will be necessary to raise and shore the fuselage nose while the faulty jack is replaced, When weight is on landing gear, retract jack completely before removing.

(4) Remove jack, jack pad adapter, and nose landing gear restraining clamp.

(5) Replace the flush cover at the fuselage jack point.

(6) Reinflate the nose landing gear strut in accordance with the directions on the strut placard.

4. Jacking at the Main Landing Gear

A. General.

Each main landing gear is provided with three jack points; one under the central pivot point of the truck axle beam and one under each wheel axle as shown on Figure 2. The maximum jacking load permitted at the forward wheel axle jack point is 45,200 pounds; the maximum jacking load permitted at the aft wheel axle jack point is 41,500 pounds. The maximum jacking load permitted at the central pivot jack point is 86,700 pounds. The total maximum allowable airplane gross weight for jacking at landing gears is 185,000 pounds.

CAUTION: DO NOT JACK THE AIRPLANE IN WINDS EXCEEDING 35 KNOTS.

B. Equipment Required.

(1) One 50-Ton Hydraulic Main Landing Gear Alligator Jack (Regent Model No. 3920 or equivalent).

(2) One 25-Ton Main Landing Gear Wheel Axle Alligator Jack (Regent Model No. 993R or equivalent).

C. Jacking Procedure at the Main Landing Gear Axle Beam Center Jack Pad.

CAUTION: DO NOT JACK THE AIRPLANE IN WINDS EXCEEDING 35 KNOTS.

(1) Install down-lock safety pins in all landing gears.

(2) Chock the nose and opposite main gear wheels.

(3) Move the 50-ton alligator jack under the pad at the centerline of the strut as shown on Figure 2.

(4) Release the parking brakes.

(5) Raise the main landing gear truck.

D. Jacking Procedure at the Main Landing Gear Forward or Aft Axle Jack Pad.

CAUTION: DO NOT JACK THE AIRPLANE IN WINDS EXCEEDING 35 KNOTS.

(1) Install down-lock safety pins in all landing gears.

(2) Chock the nose and opposite main gear wheels.

(3) Move the 25-ton alligator jack under the axle jack pad of the wheels to be raised.

(4) Release the parking brakes.

(5) Raise the main landing gear wheel axle.

CAUTION: DO NOT RAISE THE WHEEL AXLE HIGHER THAN THE JACKING LIMIT DIMENSIONS SHOWN ON FIGURE 4. (THE MAXIMUM LIMIT IS 5.48 INCHES AT THE FORWARD AXLE AND IS 10.00 INCHES AT THE REAR AXLE, PERPENDICULARLY.)

5. Jacking at the Nose Landing Gear Jack Pad

A. General.

The nose landing gear is provided with a jack pad at the lower end of the strut, under the anti-skid mechanism as shown on Figure 2. The maximum jacking load permitted at this jack point is 15,000 pounds. The total maximum allowable airplane gross weight for jacking at landing gears is 185,000 pounds.

CAUTION: DO NOT JACK THE AIRPLANE IN WINDS EXCEEDING 35 KNOTS.

B. Equipment Required.

(1) One 25-Ton Main Landing Gear Alligator Jack (Regent Model No. 993R or equivalent).

(2) One Nose Landing Gear Steering Rig Pin (National Water Lift 125088 or equivalent).

C. Jacking Procedure.

CAUTION: DO NOT JACK THE AIRPLANE IN WINDS EXCEEDING 35 KNOTS.

(1) Install down-lock safety pins in all landing gears.

(2) Position wheel chocks firmly on the aft side of each main landing gear truck and loosely on the forward side.

(3) Lock the nose steering mechanism in center position with steering rig pin.

(4) Move the 25-ton alligator jack under the pad below the anti-skid mechanism at the lower end of the strut as shown on Figure 2.

(5) Release the parking brakes.

(6) Raise the nose landing gear assembly.

6. Jacking at a Main Landing Gear When Four Tires Are Flat

A. Equipment Required.

(1) One 25-Ton Main Landing Gear Wheel Axle Alligator Jack (Regent Model No. 993R or equivalent).

(2) One Special Jacking Tool and Related Parts (as shown on Figure 3 or equivalent).

B. Jacking Procedure.

CAUTION: DO NOT JACK THE AIRPLANE IN WINDS EXCEEDING 35 KNOTS.

(1) Install down-lock safety pins in all landing gears.

(2) Chock the nose and opposite main gear wheels.

(3) Position the special jacking tools under the center jack pad at the centerline of the strut as shown on Figure 3.

(4) Position the 25-ton alligator jack under one end of the special jacking tool and the support block under the other end.

(5) Jack end of tool approximately 2 inches, then place a support block under the center of the special jacking tool. Lower the jack until landing gear rests on jacking tool and center support block.

(6) Add additional support blocks under the support block end to compensate for the amount the jacked end is raised.

(7) Repeat steps (5) and (6) until the four flat tires clear the ground sufficiently for them to be replaced.

7. Lifting Airplane with Pneumatic Bags

A. Equipment Required.

(1) Ten or more pneumatic lifting bags (U. S. Rubber Company Type F-2 or equivalent).

(2) Wing and fuselage tripod jacks, as required for airplane jacking, when the terrain permits a safe foundation for using jacks.

(3) Felt pads, fork lift pallets, and shoring material, as required.

B. Lifting Procedure.

(1) Lighten the airplane as much as possible by removing all loose equipment and baggage. If possible, the airplane should be defueled and the liquids should be drawn from other airplane tanks when practicable.

(2) Check the undersides of the airplane for sharp, rough, or abrasive projections or surfaces that might puncture or damage the pneumatic bags. Cover the tops of the bags with felt pads to provide additional bag protection from injurious areas. Use tarpaulin covers underneath the bags to protect them from rough ground areas or bag supporting devices.

(3) Position the bags under the wing and fuselage surfaces at main structural areas so that lifting loads will be evenly distributed as shown on Figure 5. Two bags must be centrally located under each wing splice area along wing station 224.7 and one bag must be placed under each wing skin splice area at center spar station 557.5 (approximately 25 inches inboard from the outboard pylons). Four bags must be located under the fuselage at the fuselage stations shown on Figure 5.

SHORING

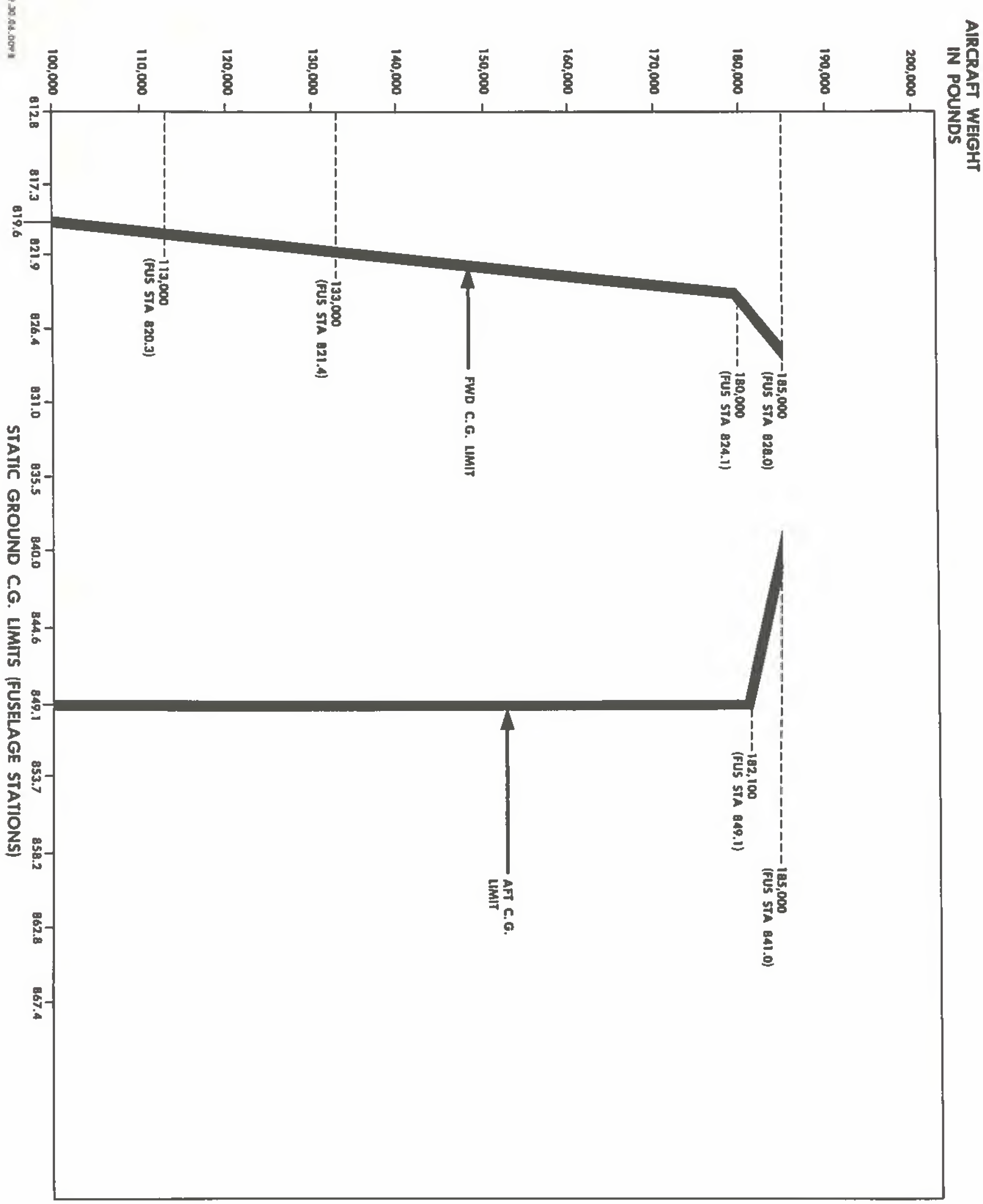
1. General

Shoring is used during primary structural repairs and when other means of supporting the airplane are not practical. Shoring fixtures are placed under, and in alignment with primary structural members such as spars, beltframes, and wing splices. Blocks placed next to the skin surfaces should be padded and covered with felt or rubber to eliminate the possibility of scratching or denting the surface. These blocks should be of sufficient width to distribute the load evenly across the width of the underlying structural member. Airplane weight must be reduced to a minimum by removing fuel and other nonessential equipment before shoring. Remove the engines before shoring for major wing repair. Shoring at the following support points will ensure that the fuselage and wings are in the "no load" condition.

The major support points for the fuselage shoring are located at fuselage stations 250, 926, and 1374. The auxiliary support points for the fuselage shoring are located at fuselage stations 306 and 326, 451 and 470, 603 and 622, 1021 and 1040, 1135 and 1154, 1249 and 1265. The major support points are at the front spar, center spar, and rear spar for wing shoring at Bulkhead 8 and 23, and the front spar and rear spar for wing shoring at Bulkhead 36.

2. Center of Gravity Limitations - Static Ground Condition.

Center of gravity limitations, with the airplane on the ground, are given for various weights on Figure 1. This information may be particularly useful during shoring operations.



Center of Gravity Limitations -
Static Ground Condition
Figure 1

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1. General

Lifting the airplane consists of such operations as jacking the entire airplane, jacking at each landing gear, and raising the airplane with pneumatic lifting bags. Jacking provisions are incorporated in each wing and in the fuselage nose for the jacking of the entire airplane. Integral lugs on the main and nose landing gear provide jacking points for individual gear jacking. Although infrequently used, pneumatic lifting bags provide a means of raising the airplane following a wheels-up landing, or supporting the airplane under unusual circumstances. Precautions such as removing all unnecessary equipment in the area and the checking of overhead clearances must be observed.

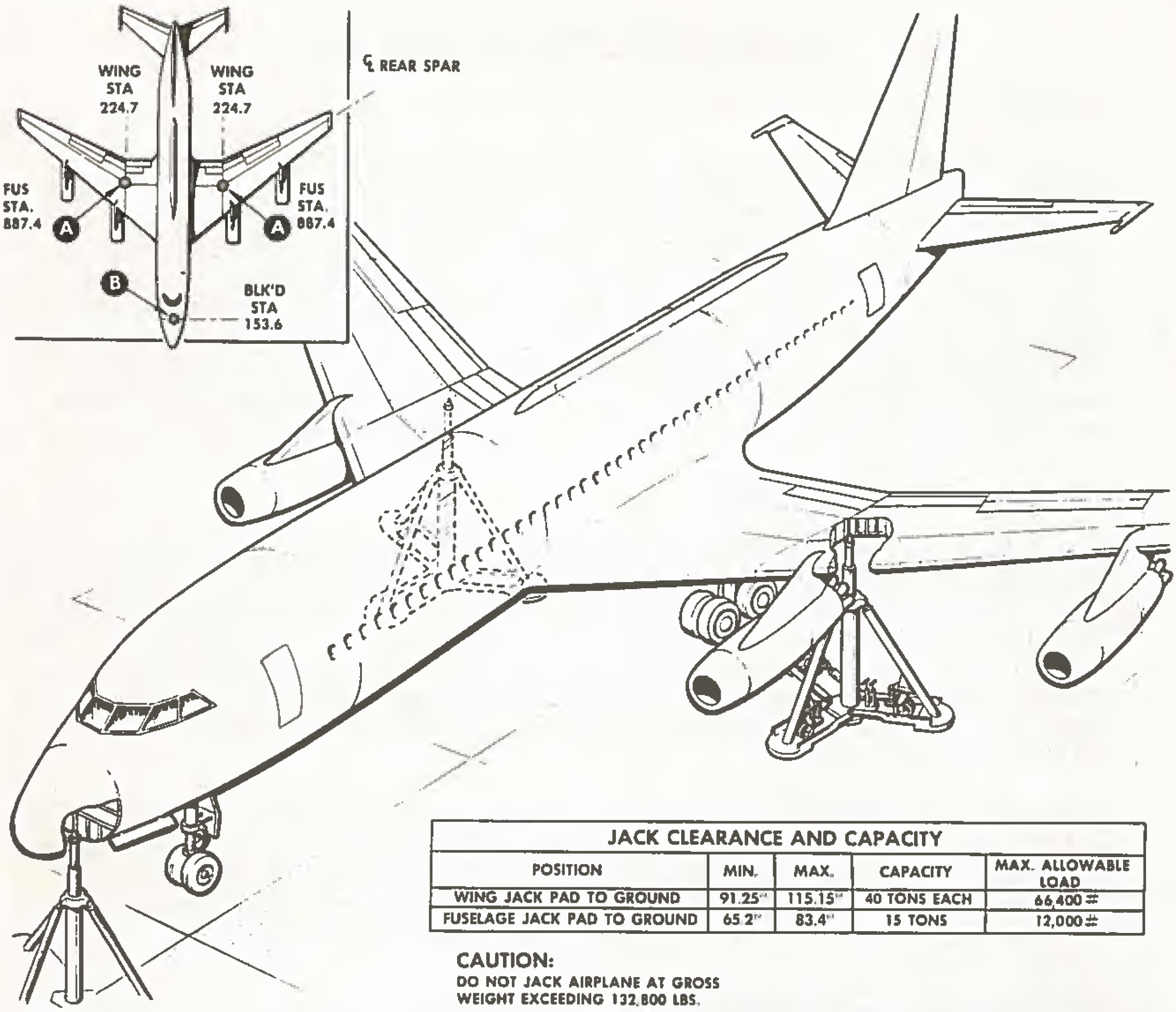
2. Jacking the Entire Airplane

The entire airplane is raised using the three airplane structure jack points as shown on Figure 1. The fuselage jack point is located at station 153.6, just forward of the nose landing gear wheel well; the two wing jack points are located at wing station 224.7, four inches aft of the rear spar. When not in use, the jack fitting openings are covered with flush covers to retain aerodynamic smoothness. Jacking operations should be simultaneous to keep the airplane in a lever attitude--this will prevent overloading by eliminating side loads.

A restraining clamp can be used on each landing gear strut to prevent the strut from extending while the airplane is being lifted. However, if restraining clamps are used the landing gear struts must be deflated. The clamps will not support the weight of the landing gear in addition to the tension applied against the clamps by the inflated struts.

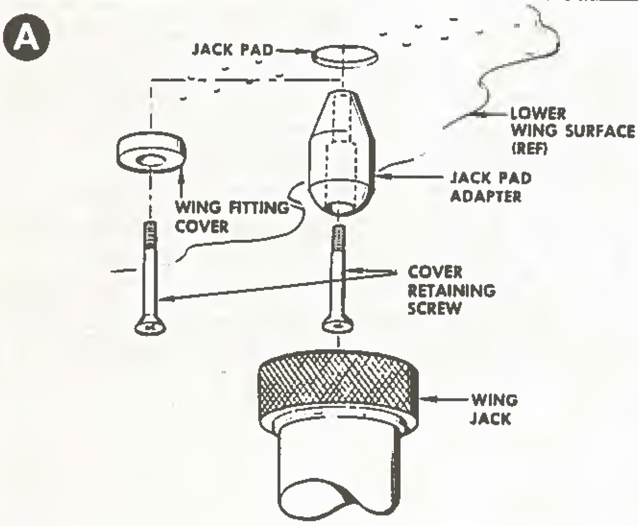
3. Jacking at the Landing Gears

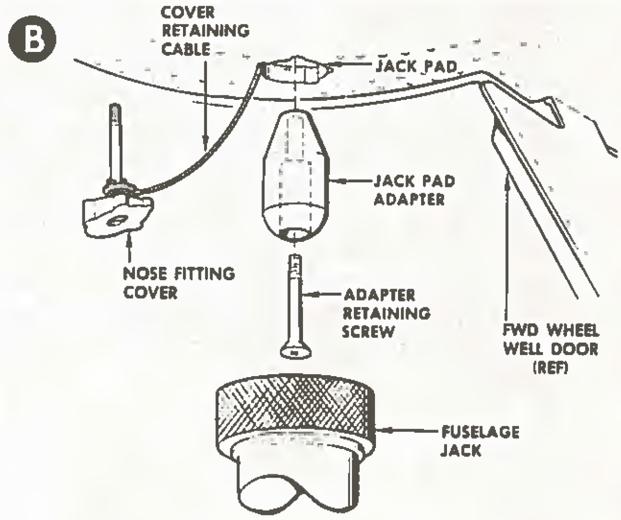
Three integral jacking lugs are incorporated on each main gear axle beam and one on the nose gear to enable the wheels or gear to be lifted individually for servicing. Down-lock safety pins must be installed in the drag brace of the nose gear and the side braces of the main gears to prevent them from inadvertently retracting. Main landing gear wheel or brake servicing is accomplished by raising the front or rear of the main gear trucks by means of the integral pads shown on Figure 2. When jacking under the nose landing gear, or at the main landing gear lugs, only lift the gear high enough so that the tires clear the ground. See Figure 3 for main landing gear jacking tools used when 4 tires are flat. The jacking limits shown on Figure 4 must not be exceeded when jacking at the main landing gear.



JACK CLEARANCE AND CAPACITY				
POSITION	MIN.	MAX.	CAPACITY	MAX. ALLOWABLE LOAD
WING JACK PAD TO GROUND	91.25"	115.15"	40 TONS EACH	66,400 #
FUSELAGE JACK PAD TO GROUND	65.2"	83.4"	15 TONS	12,000 #

CAUTION:
DO NOT JACK AIRPLANE AT GROSS WEIGHT EXCEEDING 132,800 LBS.





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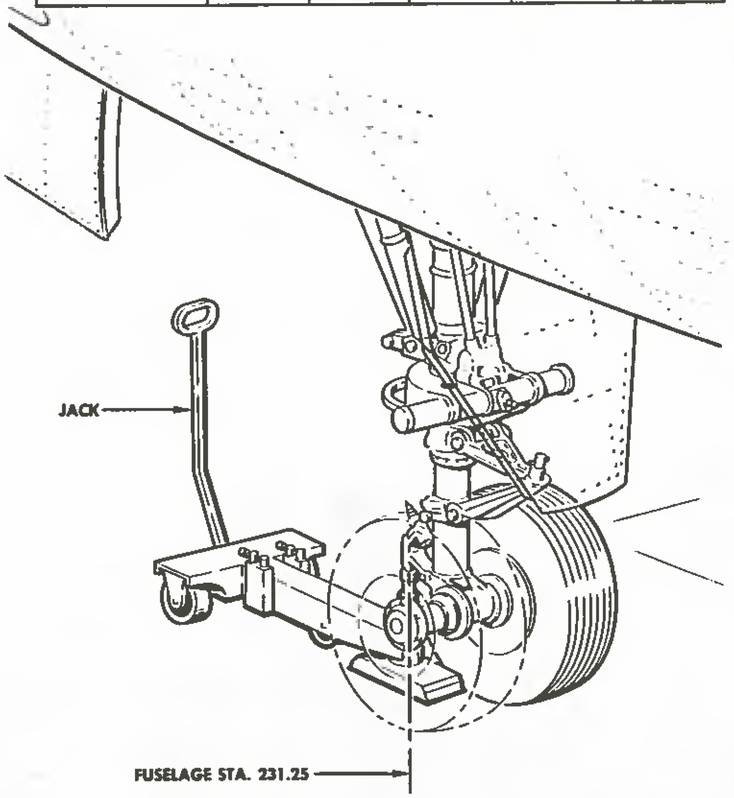
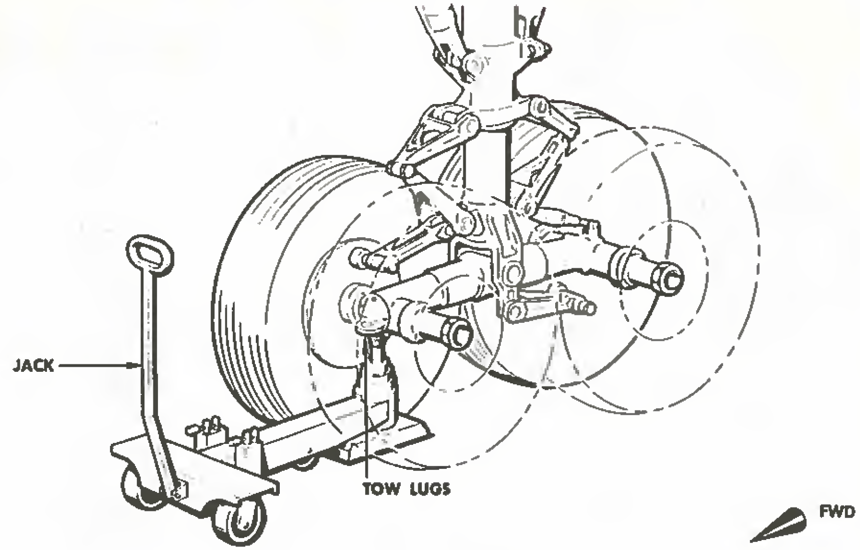
Fuselage and Wing Jack Points
Figure 1

JACK PAD TO SURFACE DIMENSIONS

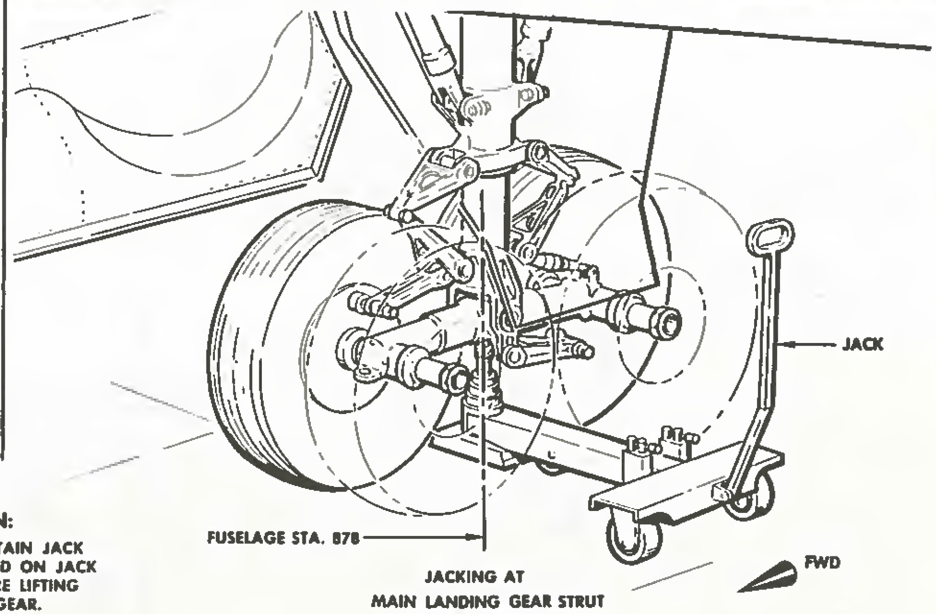
JACK POSITION	TIRES INFLATED	4 TIRES FLAT	2 TIRES FLAT	REQUIRED JACK CAPACITY	MAXIMUM ALLOWABLE LOAD
MLG STRUT JACK POINT	11.62"	6.95"	9.88"	50 TONS	86,700 #
FORE OR AFT TRUCK JACK POINT	12.62"		6.95"	25 TONS	FWD 45,200 # AFT 41,500 #
NLG	13.8"		11.1"	25 TONS	15,000 #



JACKING AT
NOSE LANDING GEAR



JACKING AT
MAIN LANDING GEAR TRUCK



JACKING AT
MAIN LANDING GEAR STRUT

CAUTION:
MAKE CERTAIN JACK IS CENTERED ON JACK PAD BEFORE LIFTING LANDING GEAR.

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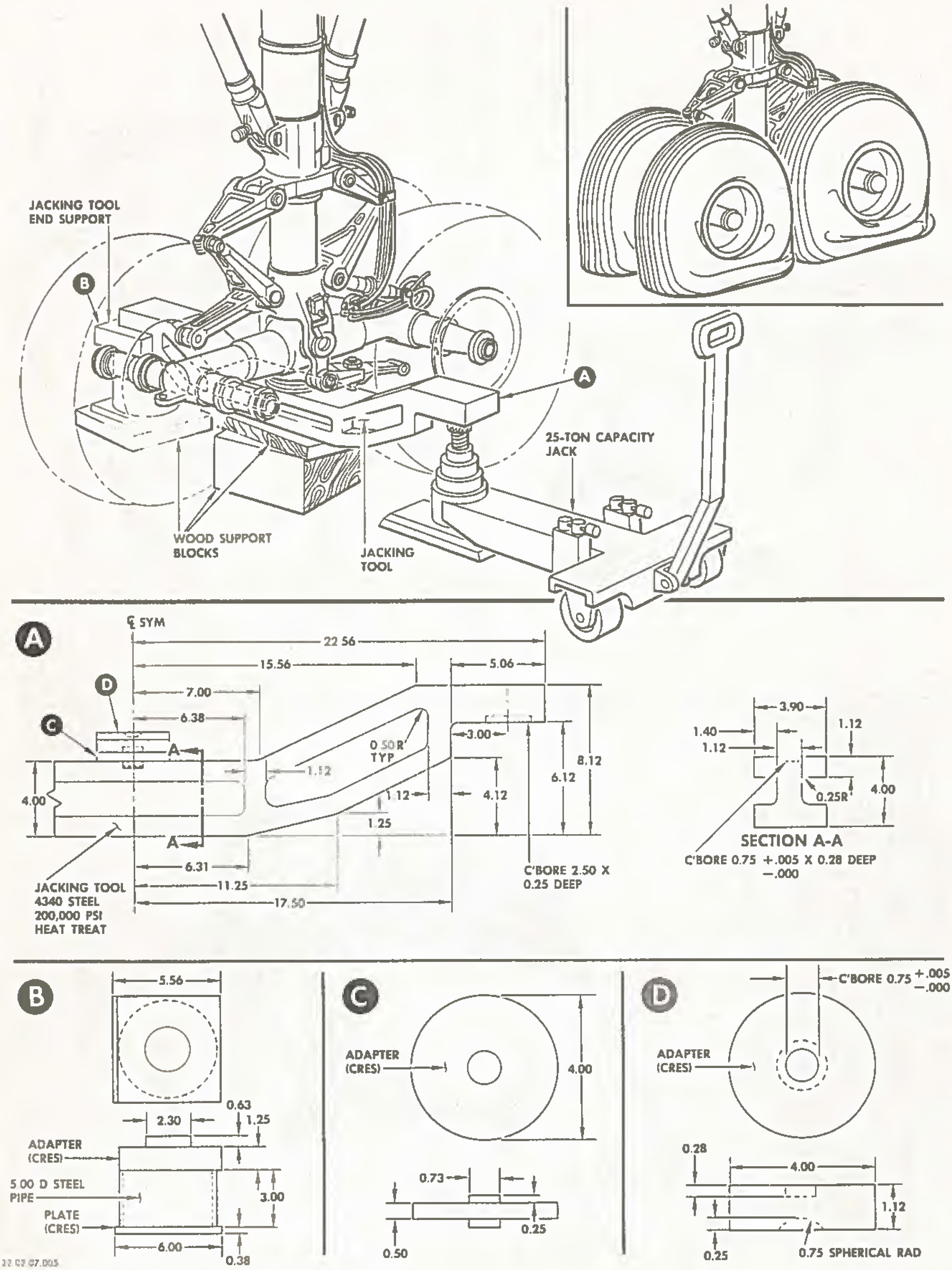
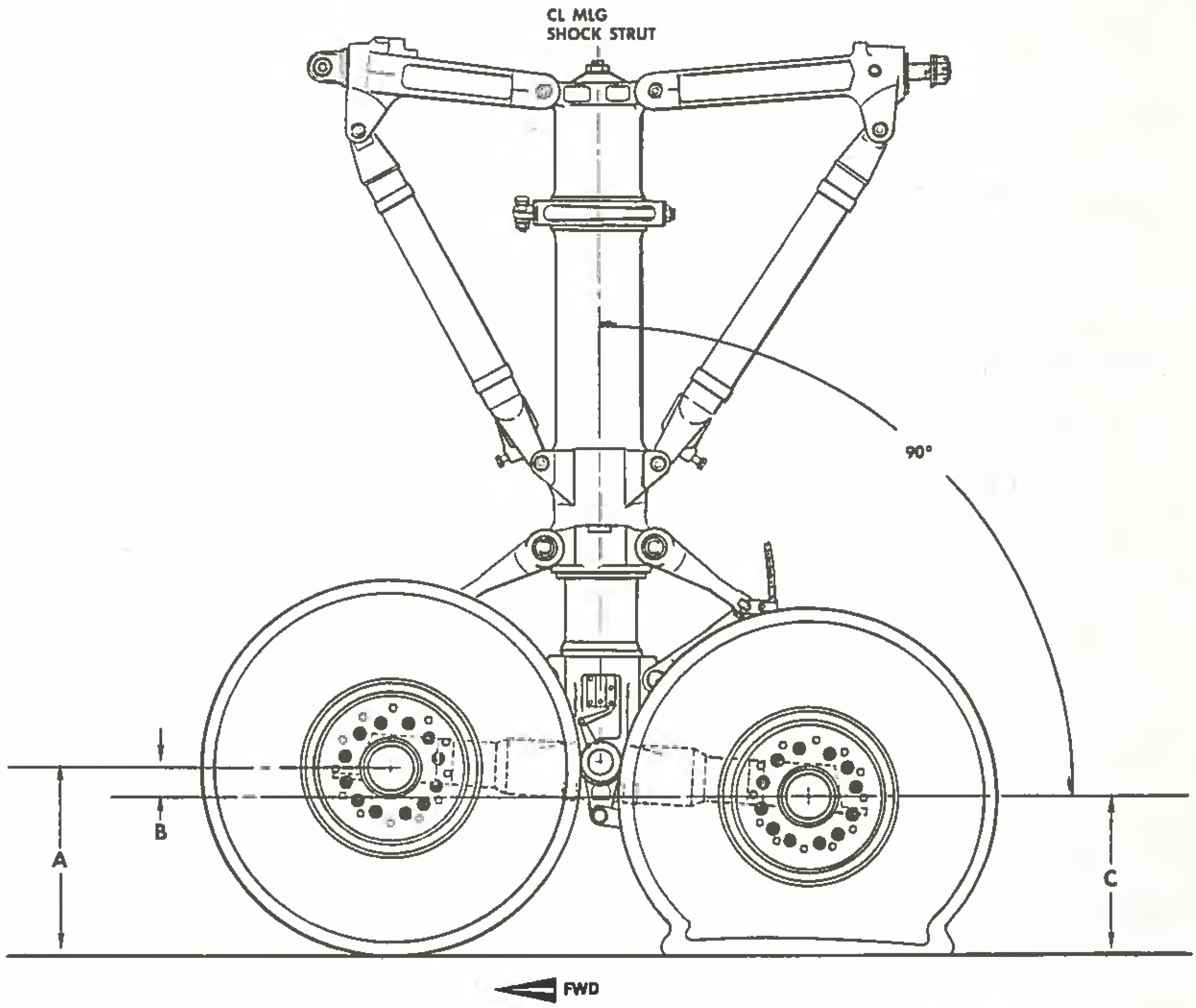
Landing Gear Jack Points
Figure 2



Main Landing Gear Jacking Tool (4 tires flat)
Figure 3



MAIN LANDING GEAR TRUCK BEAM JACKING LIMITS AT FWD AND AFT JACK PADS

DIM.	4 FLAT TIRES	NO TIRES (WHEEL RIMS ON GROUND)	2 TIRES INFLATED SAME AXLE— 2 TIRES FLAT SAME AXLE— JACK AT FLAT TIRE END
"A"	FWD = 16.88	FWD = 14.88	FWD = 21.40
"B"	FWD = 5.48	FWD = 5.48	FWD = 5.48
	AFT = 10.00	AFT = 10.00	AFT = 10.00
"C"	AFT = 19.40	AFT = 19.40	AFT 24.92

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Main Landing Gear Jacking Limits
Figure 4

4. Jacking at the Main Landing Gear With 4 Tires Flat

A locally fabricated jacking tool may be made to lift the main landing gear when 4 tires are flat as shown on Figure 3. Down-lock safety pins must be installed in all landing gears. This tool is inserted between the forward and aft tires and positioned directly underneath the strut center jack pad. A 25-ton capacity jack is placed under one end of the tool and a support block under the other end. Jacking is accomplished by jacking one end of the tool and placing a support block under the center of the tool; then building up the height of the end support block and repeating the same procedure until the main landing gear is jacked high enough to replace all 4 flat tires.

5. Lifting Clearances

A. Wing and Fuselage Jack Clearances.

The following chart shows the clearance, in inches, between the wing and fuselage jack pads and the jacking surfaces under various conditions:

CONDITION	JACKING POINTS	
	Left and Right Wing	Forward Fuselage
Struts fully extended and tires inflated.	115.55	83.4
Struts compressed and tires inflated	99.55	70.4
Struts compressed and two or four flat tires.	91.25	65.2

B. Landing Gear Jack Clearances.

The following chart shows the clearance, in inches, between the landing gear jack pads (point on jack pad sphere closest to ground) and the jacking surfaces under various conditions:

CONDITIONS	JACKING POINTS			
	NLG	Fwd MLG	Center MLG	Aft MLG
Tires inflated.	13.90	12.53	11.63	11.90
Two flat tires.	2.20	7.80	9.26 9.22	- 6.96

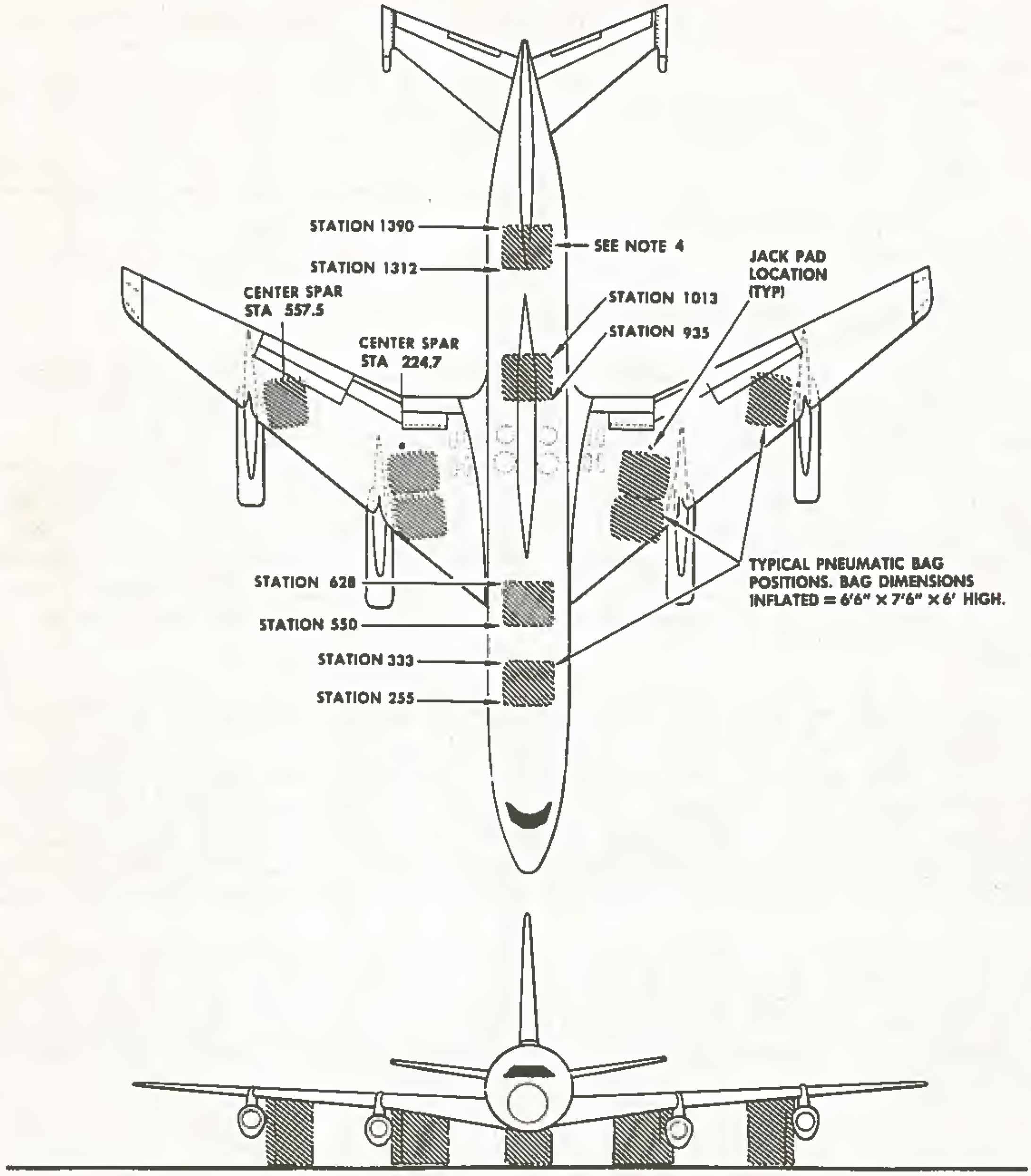
CONDITIONS	JACKING POINTS			
	NLG	Fwd MLG	Center MLG	Aft MLG
Four flat tires.	-	8.00	7.10	7.38
No tires on two wheels (rims on ground).	10.20 -	6.00 -	8.40 8.32	- 5.04
No tires on four wheels (rims on ground).	-	6.00	5.10	5.38

6. Lifting Airplane with Pneumatic Bags

If soft terrain or other conditions prohibit normal lifting procedures during emergencies, the airplane can be raised with pneumatic bags as shown in Figure 5. Type F-2 lifting bags, manufactured by the U. S. Rubber Co., (or equivalent) can be used to raise the airplane high enough to permit it to be shored or supported by the landing gear or airplane jacks. These bags may be inflated to a height of six feet and have a lifting capacity of 24,000 pounds. If necessary, the bags may be stacked and laced together and manifolded so as to receive air simultaneously. Each lifting bag has a tarpaulin cover to protect the bag from being damaged.

Lifting procedures may vary slightly depending on the extent of damage to the airplane, wind conditions and surrounding terrain. The airplane should be lightened as much as possible, prior to lifting, by removing all loose equipment and baggage. If possible, the airplane should also be defueled. The underside of the airplane should be checked for sharp and/or rough projections which could puncture the bags. Felt pads may be used in addition to the tarpaulin covers to protect the bags from any rough areas.

When the airplane has been lifted to a sufficient height, jacks or shoring should be used to support the airplane. In some cases, it may be possible to extend and lock the landing gear. The lifting bags should not be used to support the airplane in lieu of standard equipment which is designed to do this job.



NOTES:
1. AIRPLANE WEIGHT MUST BE REDUCED TO ABSOLUTE MINIMUM. MAXIMUM LOAD PERMISSIBLE ON EACH BAG = 24,000 LBS.
2. BAGS CENTRALLY LOCATED UNDER WING SPLICE AREA ALLOWING CLEARANCE FOR PLACING JACKING EQUIPMENT AT STRUCTURAL JACK POINTS.
3. BAG CENTRALLY LOCATED AROUND AREA OF WING SKIN SPLICE (APPROXIMATELY 30 INCHES INBOARD OF ENGINE PYLON) AND WING CENTER SPAR.
4. EACH FUSELAGE BAG SHALL PICK UP AT LEAST FOUR FRAMES.

22.30.07.004 C

Lifting Airplane With Pneumatic Bags
Figure 5

AIRPLANE JACKING - MAINTENANCE PRACTICES

1. Jacking at the Fuselage and Wing Structure Jack Points

A. General.

The airplane is provided with three structure jack points; one at the fuselage nose and one at each wing as shown on Figure 1. The maximum allowable gross weight for jacking at the fuselage and wing structure jack points is 132,800 pounds. The maximum load permitted at the fuselage nose jack point is 12,000 pounds. The maximum load permitted at each of the wing jack points is 66,400 pounds.

CAUTION: DO NOT JACK THE AIRPLANE IN WINDS EXCEEDING 35 KNOTS.

B. Equipment Required.

(1) Two Main Landing Gear Positioner Locks (Convair 22J111 or equivalent).

(2) Three Fuselage and Wing Jack Pad Adapters (Convair 22J112 or equivalent).

(3) Two Main Landing Gear Strut Restraining Clamps (Convair 22J123 or equivalent).

(4) One Nose Landing Gear Strut Restraining Clamp (Convair 22J124 or equivalent).

(5) One 15-Ton Hydraulic Fuselage Tripod Jack (Regent Model No. 2958 or equivalent).

(6) Two 40-Ton Hydraulic Wing Tripod Jacks (Regent Model 989R or equivalent).

C. Jacking Procedure.

(1) Move the airplane onto the most level hard surface available and turn the nose into the wind if in an exposed area.

CAUTION: DO NOT JACK THE AIRPLANE IN WINDS EXCEEDING 35 KNOTS.

(2) Install down-lock safety pins in all landing gears.

(3) Completely deflate nose gear strut and install restraining clamp (22J124) to prevent strut extension when airplane is raised.

(4) Install positioner locks (22J111) on each main landing gear truck to keep rear wheels from dropping when airplane is raised. If positioner locks are not available, the airplane must be raised an additional two inches for rear tire clearance.

(5) Completely deflate both main landing gear struts and install a restraining clamp (22J123) on each strut to prevent strut extension when airplane is raised.

(6) Remove flush covers at the fuselage and wing jack points and install the jack pad adapters (22J112) with 10-32 adapter retaining screws.

(7) Move 15-ton fuselage and 40-ton wing jacks into place under jack pad adapters. Position each wing jack with one jack leg pointing straight forward.

(8) Remove wheel chocks and release parking brakes.

(9) Station a man at each jack and raise the airplane in a level attitude by operating all jacks at the same time until all landing gear tires clear the ground. Refer to Chapter 8, LEVELING AND WEIGHING, for leveling procedure if exact level condition is required.

<u>NOTE</u>: As jacks are raised, turn down the jack ram lock nuts to maintain a one-inch clearance between the nut and the ram collar. When jacking is complete, snug up nut and tighten set screw.

<u>CAUTION</u>: DO NOT RETRACT LANDING GEAR WITH DOWN-LOCK SAFETY PINS, STRUT RESTRAINING CLAMPS, OR POSITIONER LOCKS INSTALLED.

D. Lowering Procedure.

(1) Clear equipment from area under the airplane and make sure downlock safety pins are installed in all landing gears.

(2) Loosen setscrew in jack ram lock nut on each jack and turn nut up ram to provide one-inch clearance between nut and ram collar.

<u>NOTE</u>: If necessary, raise jack ram slightly to free lock nut.

(3) Lower airplane in a level attitude by releasing pressure slowly on all jacks at the same time, maintaining a one-inch clearance between the lock nut and collar at each jack.

<u>NOTE</u>: Jack may be raised and lowered alternately to free the ram in the event a jack "hangs up." If ram cannot be freed, it will be necessary to raise and shore the airplane while the faulty jack is replaced. When weight is on landing gear, retract jack fully before removing.

(4) Remove jacks, jack pad adapters, landing gear strut restraining clamps, and main landing gear positioner locks.

(5) Replace flush covers at the fuselage and wing jack points.

(6) Reinflate main and nose landing gear struts in accordance with directions on strut placard.

2. Jacking with Fuselage Jack Only

A. Equipment Required.

(1) One Fuselage Jack Pad Adapter (Convair 22J112 or equivalent).

(2) One Nose Landing Gear Strut Restraining Clamp (Convair 22J124 or equivalent).

(3) One 15-Ton Hydraulic Fuselage Tripod Jack (Regent Model No. 2958 or equivalent).

B. Jacking Procedure.

(1) Move the airplane onto the most level hard surface available and turn the nose into the wind if in an exposed area.

CAUTION: DO NOT JACK AIRPLANE IN WINDS EXCEEDING 35 KNOTS.

(2) Install down-lock safety pins in all landing gears.

(3) Position wheel chocks firmly on the aft side of each main gear truck and loosely on the forward side.

(4) Completely deflate nose gear strut and install restraining clamp (22J124) to prevent strut extension when airplane is raised.

NOTE: Omit this step if nose is being raised for replacement of nose gear strut O-rings or gear operation.

(5) Remove flush cover at the fuselage jack point and install the jack pad adapter (22J112) with a 10-32 adapter retaining screw.

(6) Move 15-ton fuselage jack into place under the jack pad adapter.

(7) Release parking brakes.

(8) Raise fuselage nose. As jack rises, turn down the jack ram lock nut to maintain a one-inch clearance between the nut and the ram collar. When jacking is complete, snug up nut and tighten set screw.

C. Lowering Procedure.

(1) Clear equipment from area under the fuselage nose and make sure down-lock safety pins are installed in all landing gears.

(2) Loosen set screw in jack ram lock nut on jack and turn nut up ram to provide one-inch clearance between the lock nut and ram collar.

NOTE: If necessary, raise jack ram slightly to free lock nut.

(3) Lower fuselage nose, maintaining a one-inch clearance between the lock nut and ram collar.

NOTE: Jack may be alternately raised and lowered to free the ram in the event jack "hangs up." If ram cannot be freed, it will be necessary to raise and shore the fuselage nose while the faulty jack is replaced. When weight is on landing gear, retract jack fully before removing.

(4) Remove jack, jack pad adapter, and nose landing gear strut restraining clamp.

(5) Replace flush cover at fuselage jack point.

(6) Reinflate strut in accordance with placard on strut.

3. Jacking at the Main Landing Gear

A. General.

The main landing gear is provided with three jack points; one at the center of the truck axle beam and one at each wheel axle, forward and aft. The maximum load permitted on the forward wheel axle jack point is 45,200 pounds; on the aft wheel axle jack point the maximum load permitted is 41,500 pounds. The maximum load permitted on the center jack point is 86,700 pounds.

B. Equipment Required.

(1) One Main Landing Gear Positioner Lock (Convair 22J111 or equivalent).

(2) One 50-Ton Hydraulic Main Landing Gear Alligator Jack (Regent Model No. 3920 or equivalent).

(3) One 25-Ton Main Landing Gear Wheel Axle Alligator Jack (Regent Model No. 993R or equivalent).

C. Jacking Procedure at the Main Landing Gear Axle Beam Center Jack Pad.

(1) Install down-lock safety pins in all landing gears.

(2) Chock nose and opposite main gear wheels.

(3) Install positioner lock (22J111) on the main landing gear truck to keep the rear wheels from dropping when gear is jacked up.

(4) Move 50-ton jack under pad at bottom centerline of strut as shown on Figure 2.

(5) Release parking brakes.

(6) Raise main landing gear strut.

D. Jacking Procedure at the Main Landing Gear Axle Beam Forward or Aft Jack Pad.

(1) Install down-lock safety pins in all landing gears and chock nose and opposite main gears.

<u>CAUTION</u>: DO NOT INSTALL TRUCK POSITIONER LOCK.

(2) Move 25-ton jack under pad located under wheel axle, forward or aft position as desired.

(3) Release parking brakes.

(4) Raise main landing gear wheel axle.

<u>CAUTION</u>: DO NOT RAISE TRUCK WHEEL AXLE (FROM A HORIZONTAL LINE THROUGH THE CENTERS OF BOTH AXLES AND PERPENDICULAR TO THE CL OF THE STRUT) MORE THAN 5.48 INCHES AT THE FORWARD PAD AND 10.00 INCHES AT THE AFT PAD, AS SHOWN ON FIGURE 4.

4. <u>Jacking at the Nose Landing Gear Jack Pad</u>

A. General.

The nose landing gear is provided with a jack pad at the lower end of the strut, under the anti-skid mechanism. The maximum load permitted on this jack point is 15,000 pounds.

B. Equipment Required.

(1) One 25-Ton Main Landing Gear Alligator Jack (Regent Model No. 993R or equivalent).

(2) One Nose Landing Gear Steering Rig Pin (National Water Lift Co., No. 125088).

C. Jacking Procedure.

(1) Install down-lock safety pins in all landing gears.

(2) Chock main gears--loosely forward side and firmly aft side.

(3) Lock nose steering in center position with steering rig pin.

(4) Move 25-ton jack under pad below skid detector on lower end of strut.

(5) Release parking brakes.

(6) Raise nose landing gear strut.

5. Jacking at the Main Gear With 4 Tires Flat

A. Equipment Required.

(1) One Main Landing Gear Positioner Lock (Convair 22J111 or equivalent).

(2) One 25-Ton Main Landing Gear Wheel Axle Alligator Jack (Regent Model No. 993R or equivalent).

(3) One Locally Fabricated Jacking Tool and Related Parts (See Figure 3).

B. Jacking Procedure at the Main Landing Gear Axle Beam Center Jack Pad With Special Jacking Tool.

(1) Install down-lock safety pins in all landing gears.

(2) Chock nose and opposite main gear wheels.

(3) Install positioner lock (22J111) on the main landing gear truck to keep the rear wheels from dropping when gear is jacked up.

(4) Position special jacking tools under center jack pad at bottom centerline of strut as shown on Figure 3.

(5) Position 25-ton jack under end of jacking tool and support block under the other end.

(6) Jack end of tool (approximately 2 inches), then place a support block under the center of the jacking tool. Lower jack so that gear rests on jacking tool and center support block.

(7) Add additional blocks under end support block to compensate for raised end.

(8) Repeat steps (6) and (7) until all 4 flat tires clear ground enough to replace tires.

6. Lifting Airplane with Pneumatic Bags

A. Equipment Required.

(1) Ten or more pneumatic lifting bags (U. S. Rubber Co., Type F-2 or equivalent).

(2) Wing and fuselage jacks, as required for airplane jacking procedure.

(3) Assorted pads, fork lift pallets, and shoring material, as required.

B. Lifting Procedure.

(1) Lighten the airplane as much as possible by removing all loose equipment and baggage. If possible, the airplane should also be defueled.

(2) Check the underside of the airplane for sharp or rough projections which may puncture the bags. Cover the tops of the bags with felt pads to protect them from the rough areas. Use the tarpaulin covers over the fork lift pallets to protect the bottoms of the bags from rough areas on the ground.

(3) Position the bags under the wings and fuselage at the main structural points so that the lifting loads will be evenly distributed over the bags. Two bags shall be centrally located under the wing splice area at wing station 224.7 and one bag under the wing skin splice at station 557.5 (approximately 25 inches inboard of the engine pylon) and center spar. Four bags shall be located under the fuselage as shown on Figure 5.

SHORING

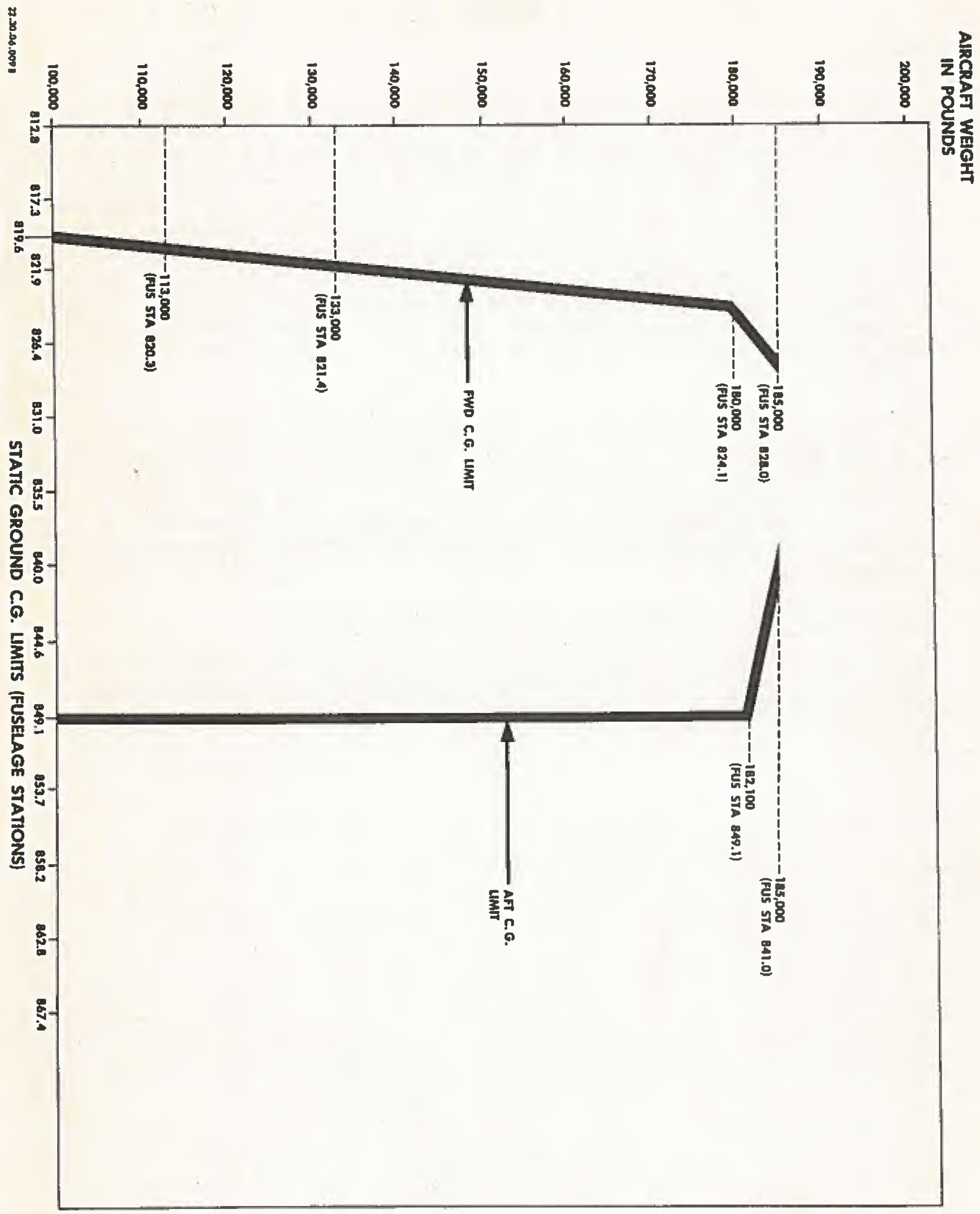
1. General

Shoring is used during primary structural repairs and when other means of supporting the airplane are not practical. Shoring fixtures are placed under, and in alignment with primary structural members such as spars, beltframes, and wing splices. Blocks placed next to the skin surfaces should be padded and covered with felt or rubber to eliminate the possibility of scratching or denting the surface. These blocks should be of sufficient width to distribute the load evenly across the width of the underlying structural member. Airplane weight must be reduced to a minimum by removing fuel and other nonessential equipment before shoring. Remove the engines before shoring for major wing repair. Shoring at the following support points will ensure that the fuselage and wings are in the "no load" condition.

The major support points for the fuselage shoring are located at fuselage stations 250, 926, and 1374. The auxiliary support points for the fuselage shoring are located at fuselage stations 306 and 326, 451 and 470, 603 and 622, 1021 and 1040, 1135 and 1154, 1249 and 1265. The major support points are at the front spar, center spar, and rear spar for wing shoring at Bulkhead 8 and 23, and the front spar and rear spar for wing shoring at Bulkhead 36.

2. Center of Gravity Limitations - Static Ground Condition.

Center of gravity limitations, with the airplane on the ground, are given for various weights on Figure 1. This information may be particularly useful during shoring operations.



Center of Gravity Limitations -
Static Ground Condition
Figure 1

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LIST OF EFFECTIVE PAGES

Chapter 8
LEVELING AND WEIGHING

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8-2-0	202	Basic	A

Chapter 8
LEVELING AND WEIGHING

TABLE OF CONTENTS

CHAPTER 8

LEVELING AND WEIGHING - DESCRIPTION AND OPERATION

1. General

Leveling and weighing procedures are utilized by maintenance personnel during repairs, replacement, installation, servicing, periodic weighing to locate center of gravity, etc. Design of the airplane includes provisions for leveling. These provisions are easily accessible and when used in conjunction with the necessary ground support equipment such as jacks, scales, etc., enable the weighing and leveling operations to be accomplished quickly and efficiently.

LEVELING - DESCRIPTION AND OPERATION

1. General

Airplane leveling is required for weighing, alignment checks, fuel tank calibration, major structural repair, etc. On some occasions inflating or deflating the applicable landing gear strut is sufficient to obtain a level attitude. Usually, however, leveling is accomplished by adjusting the extension of the jacks installed under the airframe jack points. Provisions are installed for leveling with a spirit level on leveling lugs and with a plumb line and related indicator.

Alternate methods for leveling may be accomplished by using a sight level and predetermined reference points (rivets at waterline 68) located along the outer surface of each side of the fuselage and common points in the lower surface of each wing. Leveling may also be accomplished by the water hose method using predetermined reference points (leveling holes in longeron keel) and common points on the lower surface of each wing. Alternate longitudinal leveling may be accomplished by applying a 20-inch spirit level with a 0.10-inch adapter on forward end to the longeron keel between fuselage stations 678 and 832 or by using a sight level and leveling holes in longeron keel.

2. Leveling With a Spirit Level Using Leveling Lugs

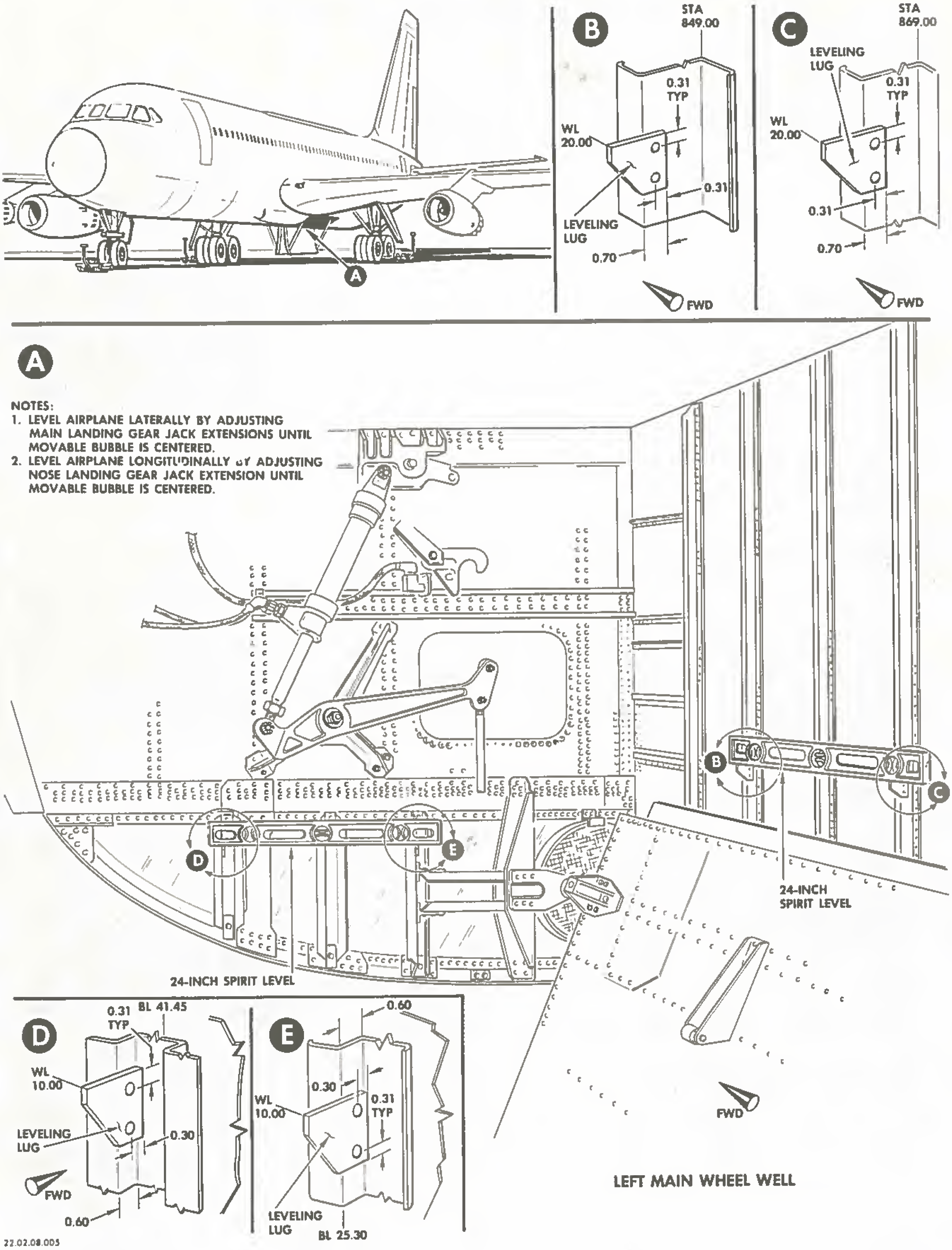
Provisions for lateral and longitudinal leveling are installed in the left main wheel well, as shown on Figure 1. The lateral leveling lugs are located on the forward bulkhead stiffeners of the left main wheel well, along WL 10.0. The longitudinal leveling lugs are located in the left main wheel well, along WL 20.0, on stiffeners of the centerline web that separates the wheel wells. A 24-inch spirit level is placed on the leveling lugs to accomplish leveling.

3. Leveling With a Plumb Line

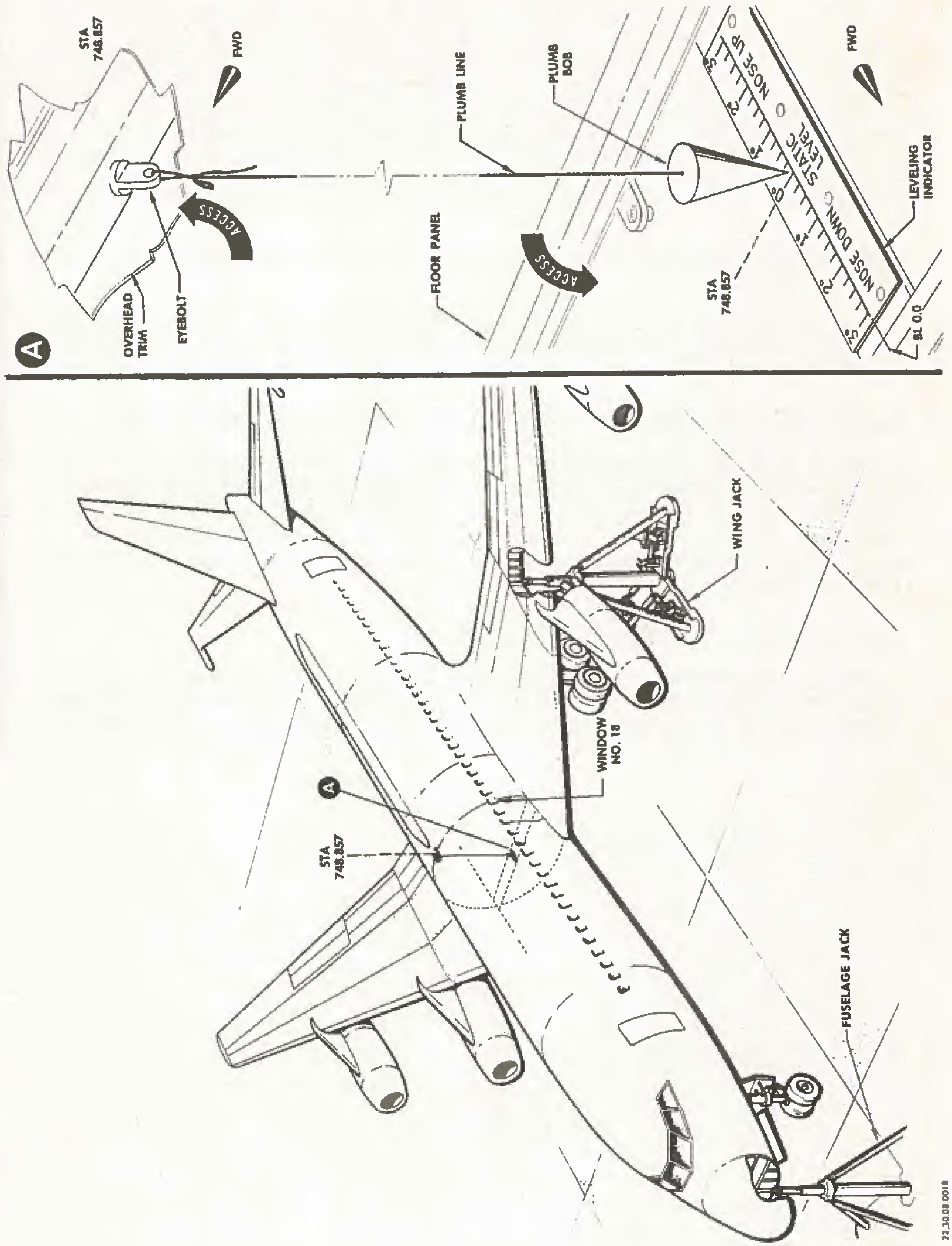
Provisions for lateral and longitudinal leveling are installed inside the cabin at fuselage station 748.8, as shown on Figure 2. The eyebolt for attaching the plumb line is located behind the trim at WL 144.48 and BL 0.0. The leveling indicator is installed at fuselage station 748.8 on the top surface of the center floor beam at WL 58.382 and BL 0.0. Access to the eyebolt and indicator is made by removing the ceiling panel and the cabin floor panel at the above mentioned fuselage station. When a lateral and longitudinal level attitude is obtained, the plumb bob will intersect the indicator zero reference point and BL 0.0.

4. Leveling With a Sight Level

Six AN470AD3 rivets (manufactured head outboard) are placed on each side of the fuselage at stations 155.75, 636.75, 650, 916.25, 930 and 1420 along



Leveling Lug Provisions - Left Main Wheel Well
Figure 1



Leveling With a Plumbline
Figure 2

WL 68.0 to be used as longitudinal reference points when leveling with a sight level. When using a sight level, the airplane must be placed in an area where ambient temperatures are nearly the same on all surfaces in order to prevent distorted readings. By using a scale with a movable indication point, the sight level can be positioned at a point lower than the rivets, as shown on Figure 3. This method is much faster than attempting to align the sight level on a horizontal plane with the reference point. Lateral leveling is accomplished in the same manner, using a sight level to observe a scale held at a common point on the lower surface of each wing.

5. Longitudinal Leveling With a Sight Level Using Leveling Holes at WL -2.0 in Longeron Keel

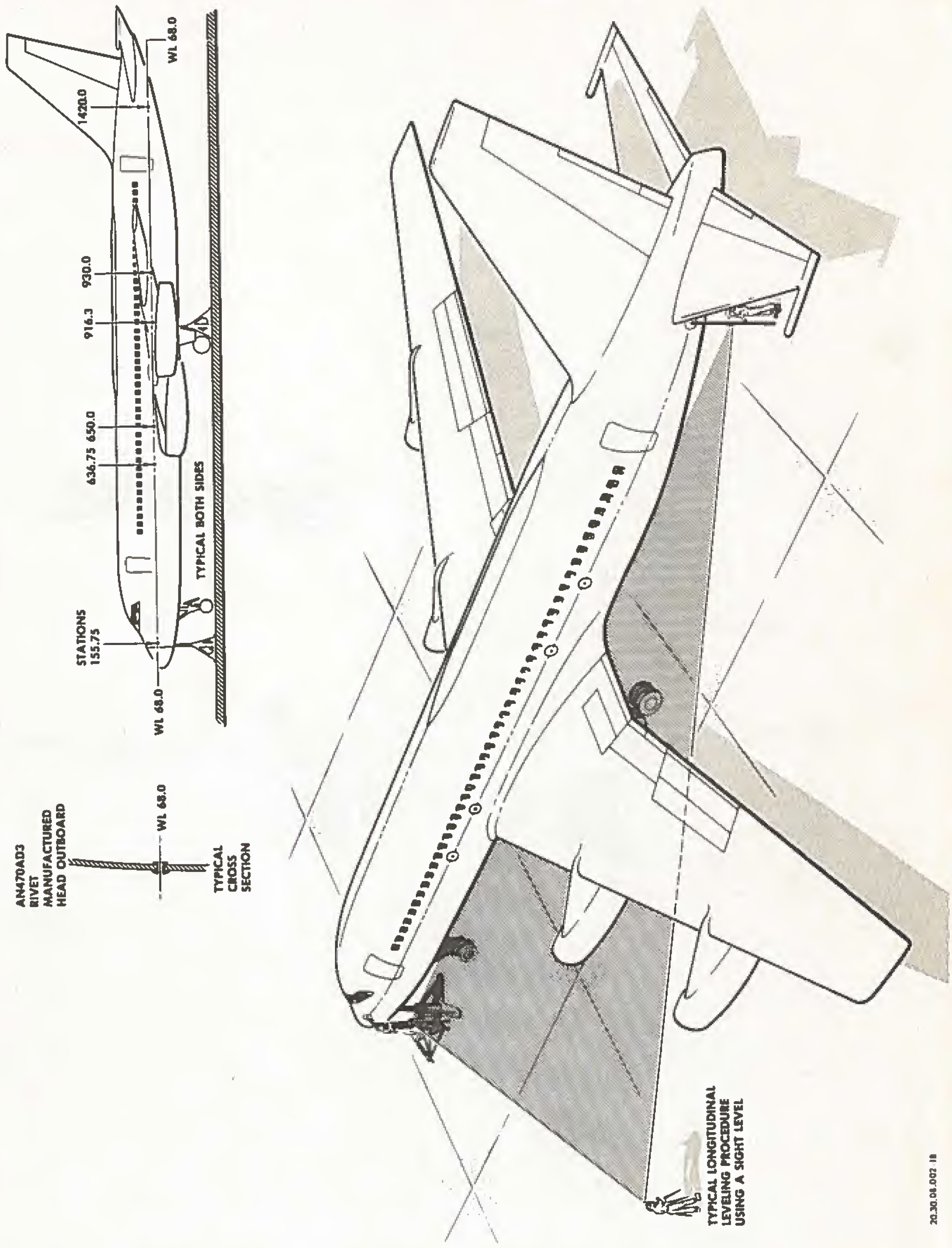
Two leveling holes are drilled in the right side of the longeron keel on WL -2.0 at fuselage stations 603 and 1036. These are used as longitudinal reference points when leveling with a sight level, as shown on Figure 4.

6. Longitudinal Leveling Using a 20-Inch Spirit Level on Longeron Keel

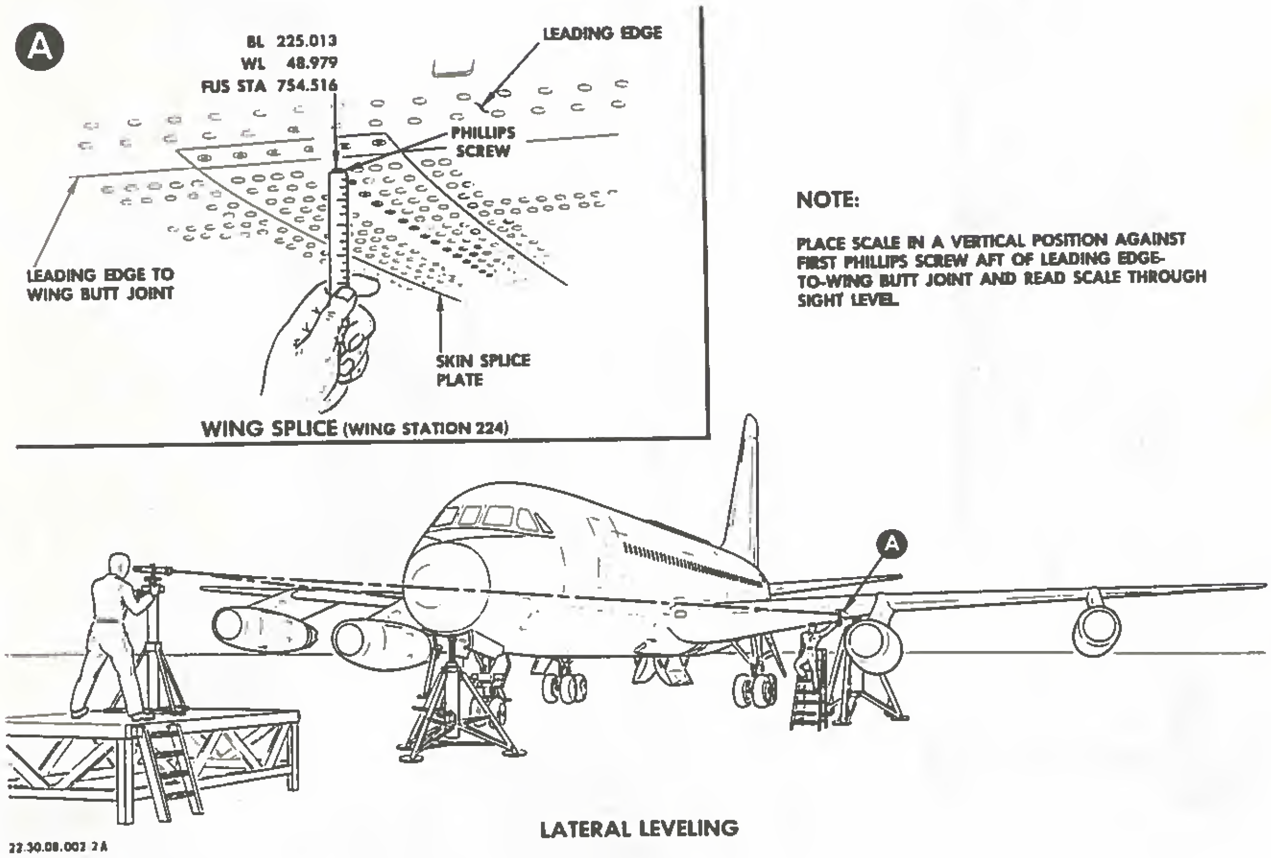
A twenty inch spirit level with 0.10-inch thick adapter plate at the forward end against the flat surface of the longeron keel anywhere between fuselage stations 678 and 832 provides a convenient method of leveling the airplane. The 0.10-inch thick adapter plate on the forward end of the spirit level is necessary to correct for the slope of the longeron in this area, as shown on Figure 5.

7. Leveling With a Transparent Water Hose

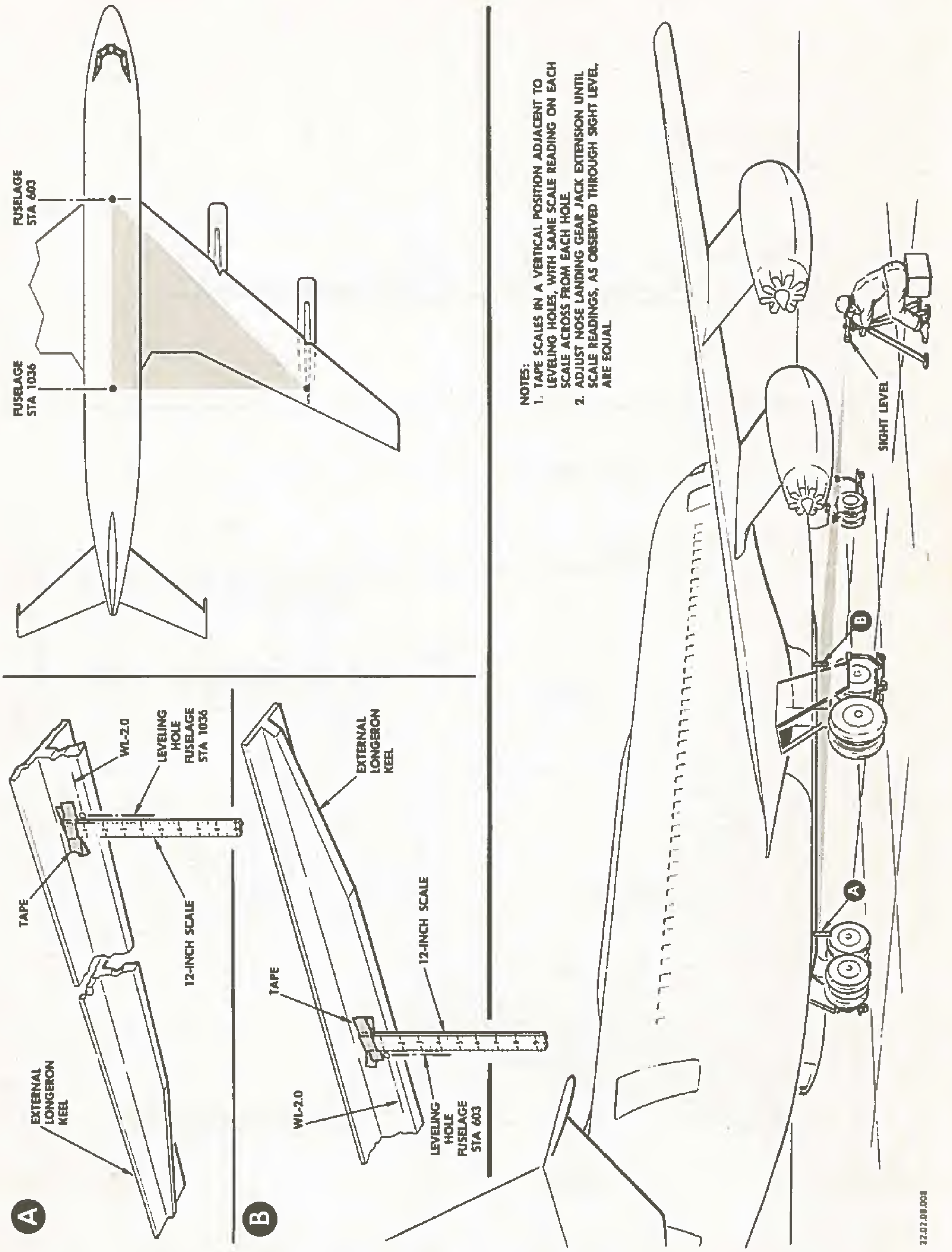
A 50-foot transparent water hose nearly filled with water may be used to level the airplane both laterally and longitudinally, as shown on Figure 6. Since water seeks its own level this method is both simple and accurate.



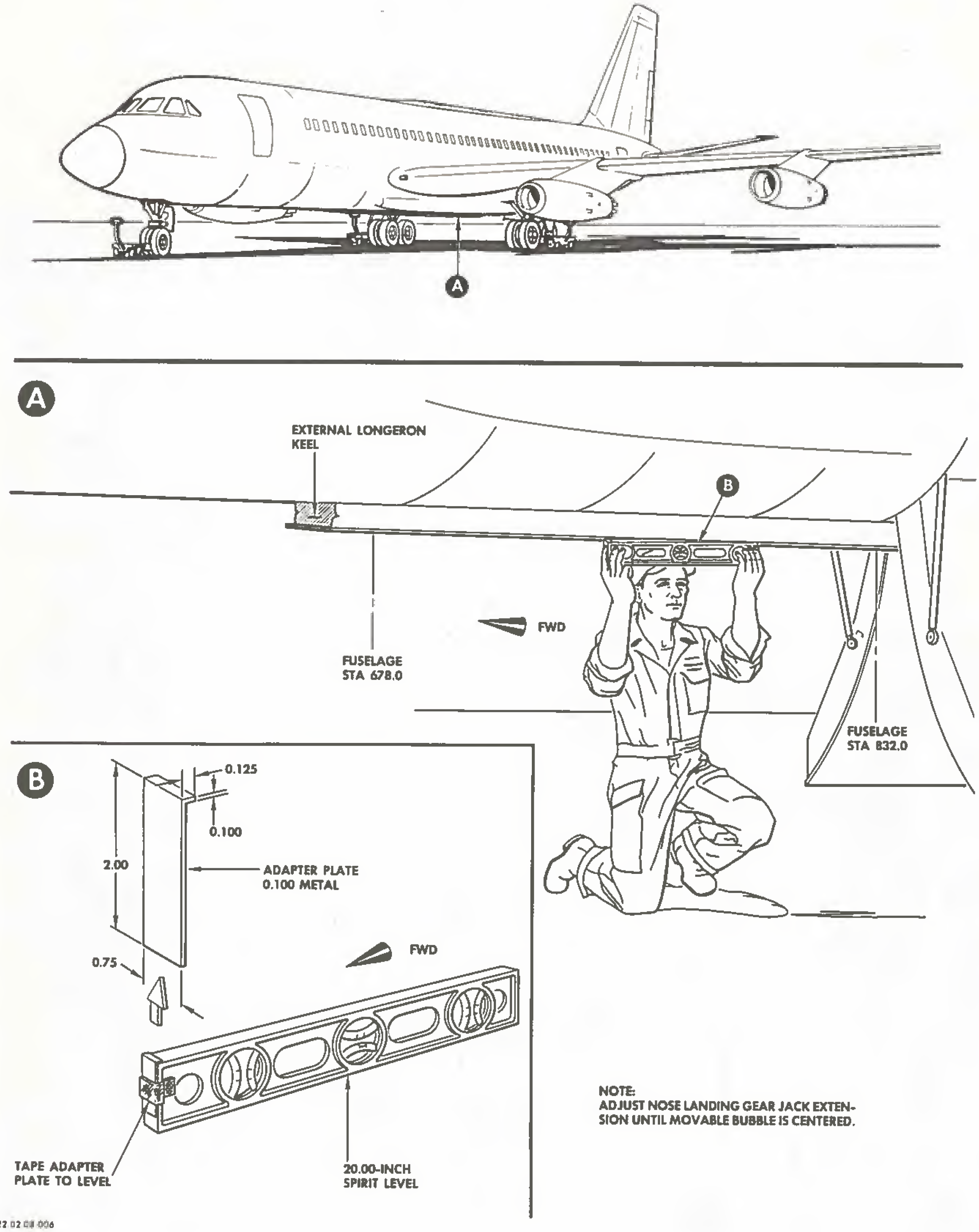
Leveling with a Sight Level
Figure 3 (Sheet 1 of 2)



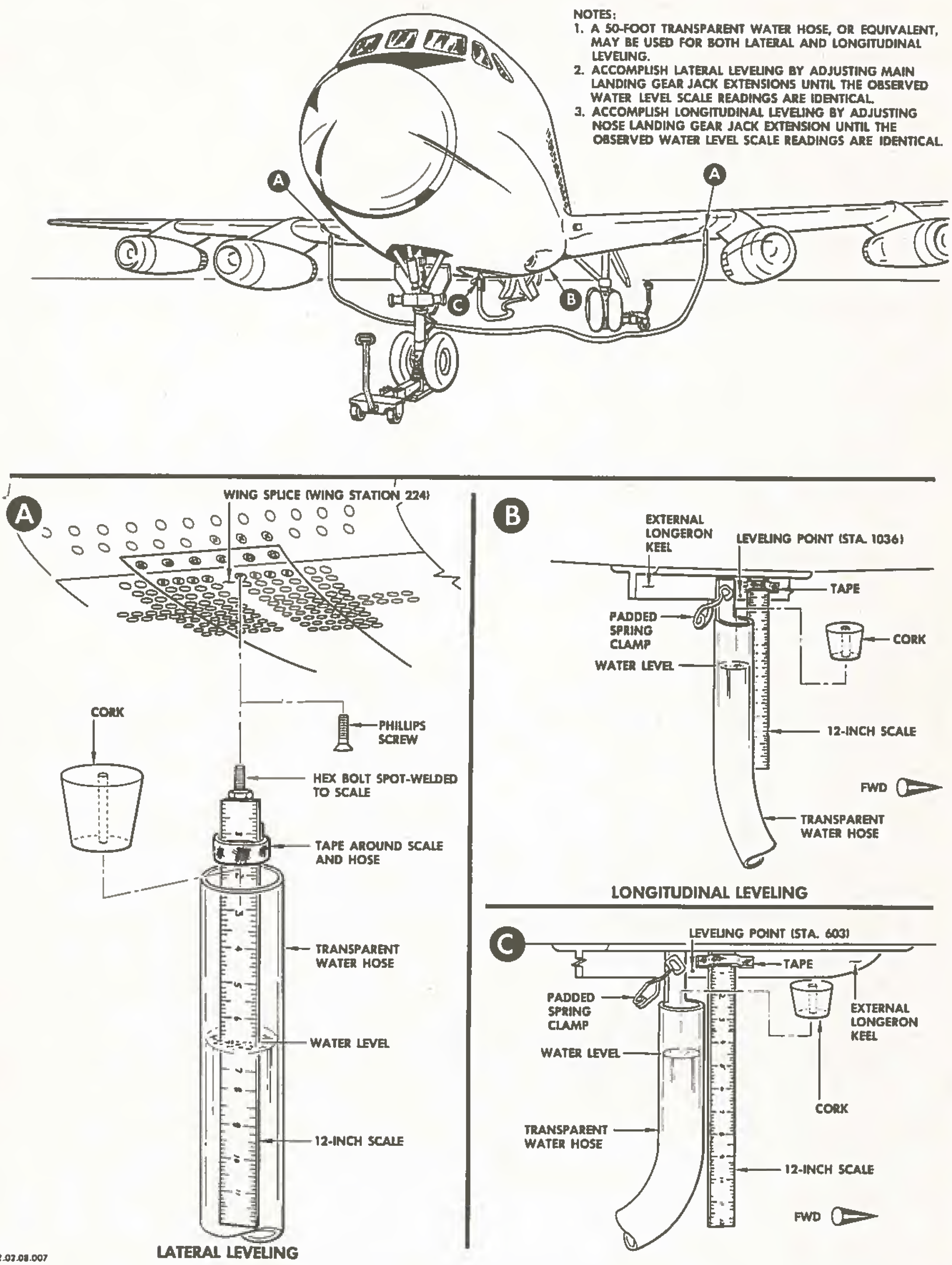
Leveling with a Sight Level
Figure 3 (Sheet 2 of 2)



Longitudinal Leveling with Sight Level
and Leveling Holes in Longeron Keel
Figure 4



Longitudinal Leveling with 20-Inch Spirit Level
Figure 5



Leveling with Transparent Water Hose
Figure 6

LEVELING - MAINTENANCE PRACTICES

1. Leveling With a Spirit Level Using Leveling Lugs

A. Equipment Required.

NOTE: The following equipment is required in addition to that listed in Chapter 7, LIFTING AND SHORING, for jacking procedure:

(1) 24-inch spirit level.

NOTE: This spirit level must be of good quality and verified accuracy.

B. Preparation.

(1) Move the airplane onto the most level surface available. Prepare airplane for jacking. Refer to Chapter 7, LIFTING AND SHORING, for instructions.

(2) Place the jacks under the airplane and jack until all landing gear tires clear the ground by one inch. Refer to Chapter 7, LIFTING AND SHORING, for instructions.

C. Level Airplane.

(1) Place 24-inch spirit level on lateral leveling lugs in left main wheel well, as shown on Figure 1.

(2) Adjust main landing gear jack extensions until the movable bubble is centered.

(3) Place 24-inch spirit level on longitudinal leveling lugs in left main wheel well, as shown on Figure 1.

(4) Adjust nose landing gear jack extension until the movable bubble is centered.

(5) Recheck lateral level (repeat step (1)).

2. Leveling With a Plumbline

A. Equipment Required.

NOTE: The following equipment is required in addition to that listed in Chapter 7, LIFTING AND SHORING, for jacking procedure:

(1) Plumbline, eight foot.

(2) Plumb bob.

B. Preparation.

(1) Move the airplane onto the most level surface available. Prepare airplane for jacking. Refer to Chapter 7, LIFTING AND SHORING, for instructions.

(2) Gain access to plumbline support eyebolt by removing ceiling panel inside cabin at fuselage station 748.8. Refer to Chapter 25, EQUIPMENT/FURNISHINGS, for instructions.

(3) Gain access to plumb bob indicator by removing carpet and cabin floor panel at fuselage station 748.8. Refer to Chapter 25, EQUIPMENT/FURNISHINGS, for carpet removal instructions and to Chapter 53, FUSELAGE, for floor panel disassembly.

(4) Attach plumbline to eyebolt as shown on Figure 2 and adjust to locate plumb bob point just above indicator.

(5) Place the jacks under the airplane and jack until all landing gear tires clear the ground by one inch. Refer to Chapter 7, LIFTING AND SHORING, for instructions.

C. Level Airplane.

(1) Adjust jack extensions until the plumb bob pointer intersects the indicator zero reference point and BL 0.0.

(2) When task is completed, remove plumbline and reinstall cabin floor panel as directed in Chapter 53, FUSELAGE, and ceiling trim as directed in Chapter 25, EQUIPMENT/FURNISHINGS.

3. Leveling With A Sight Level

A. Equipment Required.

NOTE: The following equipment is required in addition to that listed in Chapter 7, LIFTING AND SHORING, for jack procedure:

(1) Instrument stand (Keuffel & Esser No. 9092 or equivalent) or tripod capable of supporting sight level at eye level of standing man.

(2) Sight level (Keuffel & Esser No. P-5022 or equivalent).

(3) Metal scale (Keuffel & Esser No. 9099, six foot) or surveyors scale with movable indicator.

B. Preparation.

(1) Move the airplane onto the most level surface available.

(2) Place the jacks under the airplane and jack until all landing gear tires clear the ground by one inch. Refer to Chapter 7, LIFTING AND SHORING, for instructions.

(3) Place a sight level, mounted on an instrument stand or tripod, on the ground at right angles to the long axis of the fuselage (about in line with the fifth cabin window aft of the emergency access door) on either side and about sixty feet away from the fuselage.

(4) Level instrument until a level line-of-sight is indicated by the split bubble on the side of the sight level.

C. Level Airplane.

(1) Place a man, as shown on Figure 3, with a six foot metal scale or a surveyors scale with a movable indicator at fuselage station 155.75. With the top end of the scale held on the protruding AN470AD3 rivet at WL 68.0, align the sight level cross hairs on the scale body. Record the observed reading.

(2) Move the scale to fuselage station 1420. With the top end of the scale held on the protruding AN470AD3 rivet at WL 68.0 align the sight level cross hairs on the scale body. Reset instrument level and record the observed reading.

(3) Compare the scale reading and raise or lower the fuselage at the nose jack until the scale readings are identical when observed through the sight level.

(4) Move sight level to a point about twenty feet forward of the airplane; level instrument as directed in preparation step (4).

(5) Sight on scale held at common point on lower surface of each wing. See Figure 3.

(6) Compare scale readings and raise or lower one wing jack until the scale readings are identical when observed through the sight level.

4. <u>Longitudinal Leveling With a Sight Level Using Leveling Holes at WL -2.0 in Longeron Keel</u>

A. Equipment Required.

<u>NOTE:</u> The following equipment is required in addition to that listed in Chapter 7, LIFTING AND SHORING, for jacking procedure:

(1) Instrument stand (Keuffel & Esser No. 9092 or equivalent) or tripod capable of supporting sight level at eye level of sitting man.

(2) Sight level (Keuffel & Esser No. P-5022 or equivalent).

(3) Two 12-inch scales.

B. Preparation.

(1) Move the airplane onto the most level surface available.

(2) Place the jacks under the airplane and jack until all landing gear tires clear the ground by one inch. Refer to Chapter 7, LIFTING AND SHORING, for instructions.

(3) Place a sight level, mounted on an instrument stand or tripod, on the ground at right angles to the longitudinal axis of the fuselage underneath the trailing edge of the right wing at the outboard pylon, as shown on Figure 4.

(4) Tape one 12-inch scale on the longeron keel adjacent to each WL -2.0 leveling hole at fuselage stations 603 and 1036, as shown on Figure 4.

(5) Level instrument until a level line-of-sight is indicated by the split bubble on the side of the sight level.

C. Level Airplane.

NOTE: Accomplish one of the lateral leveling procedures previously described.

(1) Raise or lower the sight level so that a reading can be observed on each scale.

(2) Align the sight level cross hairs on the body of the scale at station 1036. Record the observed reading.

(3) Align the sight level cross hairs on the body of the scale at station 603. Record the observed reading.

(4) Compare scale readings and raise or lower the nose landing gear jack extension until the scale readings are identical when observed through the sight level.

5. Longitudinal Leveling Using a 20-Inch Spirit Level on Longeron Keel

A. Equipment Required.

NOTE: The following equipment is required in addition to that listed in Chapter 7, LIFTING AND SHORING, for jacking procedure:

(1) 20-inch spirit level with 0.10-inch adapter on forward end.

NOTE: This spirit level must be of good quality and verified accuracy. The 0.10-inch adapter on the forward end of the spirit level is to compensate for the slope of the longeron keel.

B. Preparation.

(1) Move the airplane onto the most level surface available.

(2) Place the jacks under the airplane and jack until all landing gear tires clear the ground by one inch. Refer to Chapter 7, LIFTING AND SHORING, for instructions.

C. Level Airplane.

NOTE: Accomplish one of the lateral leveling procedures previously described.

(1) Place the 20-inch spirit level, with 0.10-inch adapter at forward end, against the flat surface of the longeron keel between fuselage stations 678 and 832, as shown on Figure 5.

(2) Adjust nose landing gear extension until the movable bubble is centered.

6. Leveling With a Transparent Water Hose

A. Equipment Required.

NOTE: The following equipment is required in addition to that listed in Chapter 7, LIFTING AND SHORING, for jacking procedure:

(1) 50-foot transparent water hose, or equivalent.

(2) Two 12-inch scales with hex bolts spot-welded on ends.

(3) Two corks (to plug ends of water hose).

(4) Two padded spring clamps (to hold water hose to longeron keel).

B. Preparation.

(1) Move the airplane onto the most level surface available.

(2) Place the jacks under the airplane and jack until all landing gear tires clear the ground by one inch. Refer to Chapter 7, LIFTING AND SHORING, for instructions.

(3) Prepare corks, scales, and water hose as follows:

(a) Drill small hole through center of each cork. This allows atmospheric pressure to enter the corked water filled hose and may be used to drain off excess water.

(b) Spot-weld a hex head bolt to the end of each 12-inch scale, as shown on Figure 6.

NOTE: The hex head bolt must be same diameter as screw removed, but two lengths shorter.

(c) Cut out a part of each end of the water hose to form a tab, as shown on Figure 6.

(4) Fill the water hose, with water that is under pressure, allowing the water to flow through the hose until all air bubbles are expelled.

(5) Place a cork in each end of the filled hose to prevent water from spilling out while handling the hose.

(6) Remove phillips screw, shown on Figure 6, from each wing splice. (Bag and tag screws for installation.)

(7) Replace removed screws with the hex bolts to which the scales are spot-welded. Tighten bolts same number of turns until snug.

(8) Tape the 12-inch scales to each tabbed end of the filled water hose, as shown on Figure 6. Make certain that a portion of the filled water hose lies on the ground.

NOTE: For longitudinal leveling the hose is clamped to the longeron keel with padded spring clamps and the scales are fastened to the longeron keel with tape, as shown on Figure 6.

C. Level Airplane.

(1) Remove corks from ends of water hose. Allow enough time for water to stabilize before observing water level reading.

(2) Adjust one main landing gear jack extension until the observed water level readings are identical. This will ensure that the airplane is laterally level.

NOTE: After adjusting main landing gear jack extension, allow sufficient time for water in hose to stabilize before observing subsequent readings.

(3) Replace corks in ends of filled water hose and remove tape securing hose to scales. Remove hex head bolt, which the 12-inch scale is spot-welded to, from the wing splice on each wing and replace phillips screws.

(4) Tape the 12-inch scales, with hex bolts pointing down, adjacent to the leveling points at fuselage stations 603 and 1036, as shown on Figure 6. Clamp ends of the corked filled water hose adjacent to the leveling points at fuselage stations 603 and 1036 with padded spring clamps, as shown on Figure 6. Make certain that a portion of the filled water hose lies on the ground.

(5) Remove corks from ends of water hose. Allow enough time for water in hose to stabilize before observing water level reading.

(6) Adjust nose landing gear jack extension until the observed water level readings are identical. This will ensure that the airplane is longitudinally level.

NOTE: After adjusting the nose landing gear jack extension allow sufficient time for water to stabilize before observing subsequent readings.

(7) Replace corks in ends of filled water hose. Remove tape securing scales and remove clamps securing ends of water hose from the longeron keel.

MISSING CONSECUTIVE PAGES AND FIGURES
ARE NOT APPLICABLE TO THIS MANUAL

REFER TO LIST OF EFFECTIVE PAGES FOR THIS CHAPTER

MISSING CONSECUTIVE PAGES AND FIGURES
ARE NOT APPLICABLE TO THIS MANUAL

REFER TO LIST OF EFFECTIVE PAGES FOR THIS CHAPTER

WEIGHING - DESCRIPTION AND OPERATION

1. General

The basic weight of the airplane is that weight which includes all fixed operating equipment and trapped fuel and oil, to which it is necessary to add only variable or expendable load items. Basic weight plus the variable items which remain constant for a certain flight including oil, crew and emergency equipment, is known as operating weight. Total gross weight is the total weight of the airplane plus all variable items. Weighing can be accomplished by utilizing flush platform scales or electronic weighing cells used in conjunction with hydraulic jacks. The method used is dependent upon the equipment available. The following conditions should be checked before weighing.

A. Airplane level.

B. Brakes released.

C. Airplane sheltered from wind.

D. All doors and cowlings closed.

E. Proper equipment installed in the airplane.

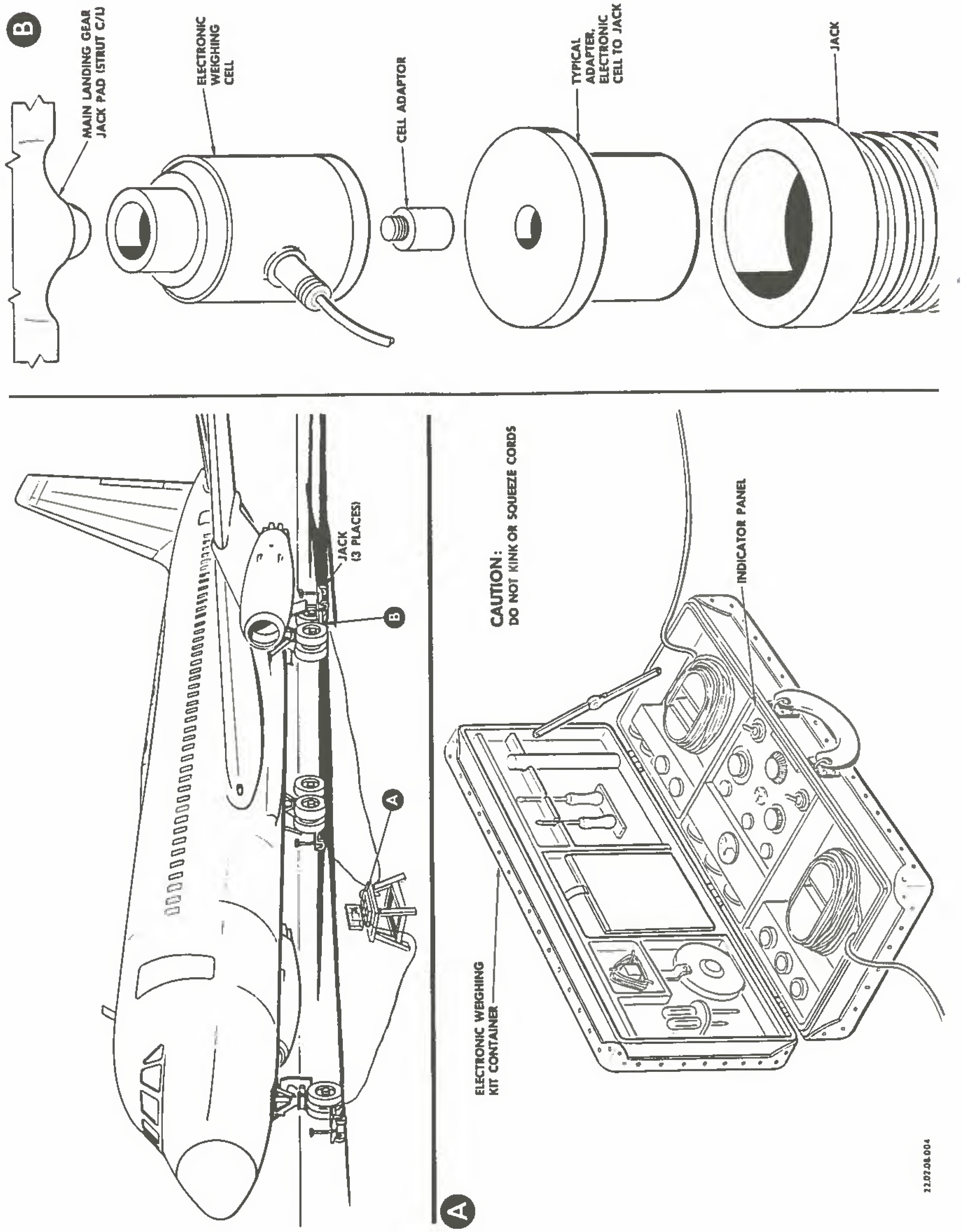
F. Jacking preparations completed; refer to Chapter 7, LIFTING AND SHORING.

2. Weighing on Flush Platform Scales

When the airplane is to be weighed on platform scales, it must be towed into position by a tug. The nose gear steering unit should be placed in a normal forward rolling position and the brakes released to prevent the scales from binding. The airplane should be leveled by adjusting the extension of the struts as necessary . The airplane weight is determined by combining the scale readings.

3. Weighing With Electronic Load Cells at the Landing Gear Strut Jack Points

The airplane should be placed in an area where it will have an approximate level attitude. The nose wheel steering unit should be placed in a normal forward rolling position and a restraining clamp placed on the main gear truck positioner to prevent the wheels from dropping during the weighing procedure. The jacks, fitted with electronic load cells, are placed under the strut jack points, as shown on Figure 1, and raised sufficiently to lift the wheels about one inch above the ground. The airplane is leveled by adjusting the extension of the jacks as necessary. Weight is determined by the electronic load cells operating in conjunction with the hydraulic jacks.



Weighing With Electronic Load Cells
Figure 1

4. <u>Weighing With Electronic Load Cells at the Structure Jack Points</u>

The airplane should be placed in an area where it will have an approximate level attitude. Restraining clamps should be installed on the gear struts to prevent them from extending as the airplane is raised. The landing gear struts must be deflated prior to installing the clamps. Deflating the struts will prevent excessive tensions and loads from being applied against the clamps. Restraining clamps should also be placed on the main landing gear truck positioners to prevent the wheels from dropping during the weighing procedure. The jacks, fitted with electronic load cells, are positioned, as shown on Figure 1, under the fuselage and wing jacking points and raised until the airplane landing gear tires are clear of the ground. Level the airplane by adjusting the jack extensions as required. Weight is determined by the electronic load cells attached to the jacks.

WEIGHING - MAINTENANCE PRACTICES

1. Weighing With Electronic Load Cells at the Landing Gear Jack Points

A. Equipment Required.

NOTE: The following equipment is required in addition to that listed in Chapter 7, LIFTING AND SHORING, for jacking the airplane at the landing gear jack points.

(1) Electronic scale weighing kit, 300,000 lb. capacity (Cox & Stevens Model CS-7B or equivalent).

B. Preparation.

(1) Move the airplane onto the most level surface available.

(2) Fit the nose and main landing gear jacks with the electronic load cells. Follow the instructions included in the weighing kit.

(3) Place the jacks, fitted with the electronic load cells, under the nose and main landing gear jack points, as shown in Figure 1, and jack until all landing gear tires clear the ground by one inch. Refer to Chapter 7, LIFTING AND SHORING, for jacking instructions.

(4) Level the airplane longitudinally by raising or lowering the nose with the nose landing gear jack and laterally by either main landing gear jacks. Verify level condition as directed in 8-1-0.

C. Weigh Airplane.

(1) Record the readings on the electronic scale meter for each of the three jacking points. Combine the readings for the total weight.

2. Weighing With Electronic Load Cells at the Structure Jack Points

A. Equipment Required.

NOTE: The following equipment is required in addition to that listed in Chapter 7, LIFTING AND SHORING, for jacking the airplane at the wing and fuselage structure jack points.

(1) Electronic scale weighing kit, 300,000 lb. capacity (Cox & Stevens Model CS-7B or equivalent).

B. Preparation.

(1) Move the airplane onto the most level surface available.

(2) Fit the fuselage and wing jacks with the electronic load cells. Follow the instructions included in the weighing kit.

(3) Place the jacks, fitted with the electronic load cells, under the fuselage and wing jack pod adapters, as shown on Figure 1, and jack until all landing gear tires clear the ground by one inch. Refer to Chapter 7, LIFTING AND SHORING, for jacking instructions.

(4) Level the airplane by raising or lowering the jacks at either wing for lateral and the fuselage nose for longitudinal. Verify level condition as directed in 8-1-0.

C. Weigh Airplane.

(1) Record the readings on the electronic scale meter for each of the three jacking points. Combine the readings for the total weight.

LIST OF EFFECTIVE PAGES

Chapter 9
TOWING AND TAXIING

CHAPTER	PAGE	DATE	CODE
9	i	May 25/61	A-1
	BLANK		
9	1	May 25/61	A-1
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9-0	1	May 25/61	A-1
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9-1-0	1	May 25/61	A-1
9-1-0	2	May 25/61	A-1
9-1-0	3	Basic	A
9-1-0	4	May 25/61	A-1
9-1-0	5	May 25/61	A-1
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9-1-0	201	May 25/61	A-1
9-1-0	202	Basic	A
9-1-0	203	May 25/61	A-1
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9-1-0	206	May 25/61	A-1
9-1-0	207	May 25/61	A-1
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9-2-0	1	May 25/61	A-1
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9-2-0	201	Basic	A
9-2-0	202	Basic	A

Chapter 9
TOWING AND TAXIING

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Chapter 9

TOWING AND TAXIING - DESCRIPTION AND OPERATION

1. General

Towing procedures are utilized to move the airplane whenever the engines are not operating or when circumstances prohibit the noise or blast effects of operating jet engines. Towing the airplane from maintenance areas or hangars to the air terminals also represents an economy measure in fuel savings. Towing is normally accomplished from the nose landing gear when the airplane is on hard, dry surfaces. In instances where the airplane is to be towed over rough terrain, or should it bog down in mud or snow, towing must be accomplished only from both main landing gears simultaneously. Under these conditions the forces required to move the airplane may exceed the maximum towing loads permissible at the nose landing gear. Towing from both main landing gears simultaneously can be accomplished in either a forward or backward direction depending on the circumstances.

Taxiing procedures can be accomplished with any number of engines, or any combination of engines operating, dependent upon the circumstances and/or operator policies. During taxiing procedures, directional control of the airplane is maintained by the use of the nose wheel steering and hydraulic brake systems. Care should be exercised to avoid endangering personnel with excessive heat or blast effects.

TEMPORARY REVISION NO. 9-1.

Insert facing 9-1-0, Page 1 dated May 24/60.

Page 1, delete sentence following first paragraph and add the following to end of first paragraph:

To correct this condition it is necessary to install 150 pounds of ballast (evenly distributed) in the forward cargo compartment. For various permissible center of gravity configurations encountered during maintenance, refer to Figure 4.

TOWING - DESCRIPTION AND OPERATION

1. General

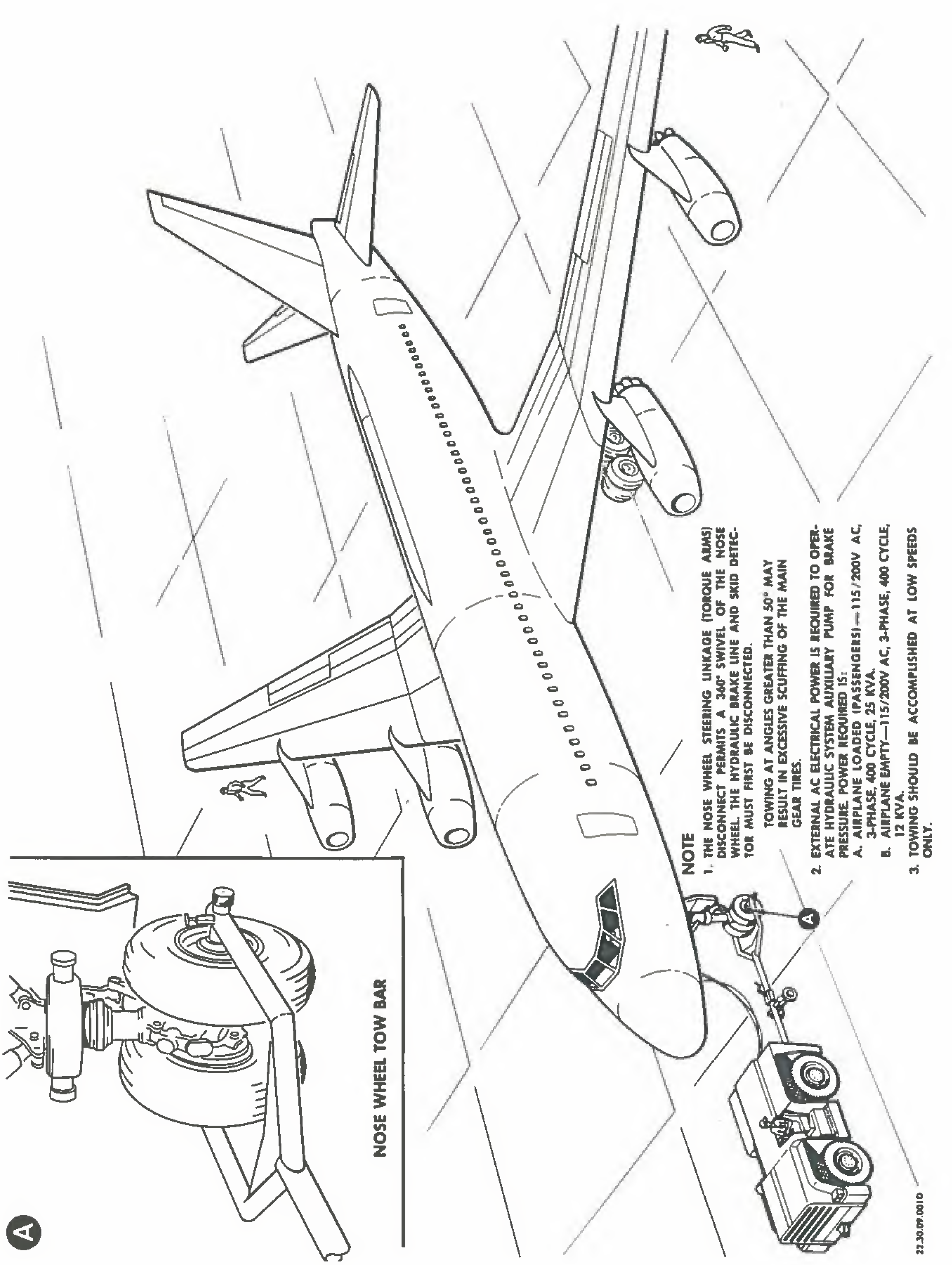
During maintenance or overhaul periods it may be necessary to tow the airplane with the engines or other heavy equipment removed. Normally, this does not create any problem during towing procedures. However, if an excessive amount of weight is removed, the subsequent shift in the airplane's center of gravity (cg) must be considered prior to towing. The airplane must never be towed when the cg is aft of station 863. When the cg has moved aft of station 863 an unsafe condition exists whereby the tail of the airplane has the tendency to tip down. An extreme condition that will result in the cg being moved aft of station 863 and will necessitate corrective action prior to towing is as follows: An airplane at empty weight (approximately 83,300 pounds), the inboard engines and flight compartment seats removed, and the electronic compartment empty of electronic gear.

To correct this condition it is necessary to install 150 pounds of ballast (evenly distributed) in the forward cargo compartment.

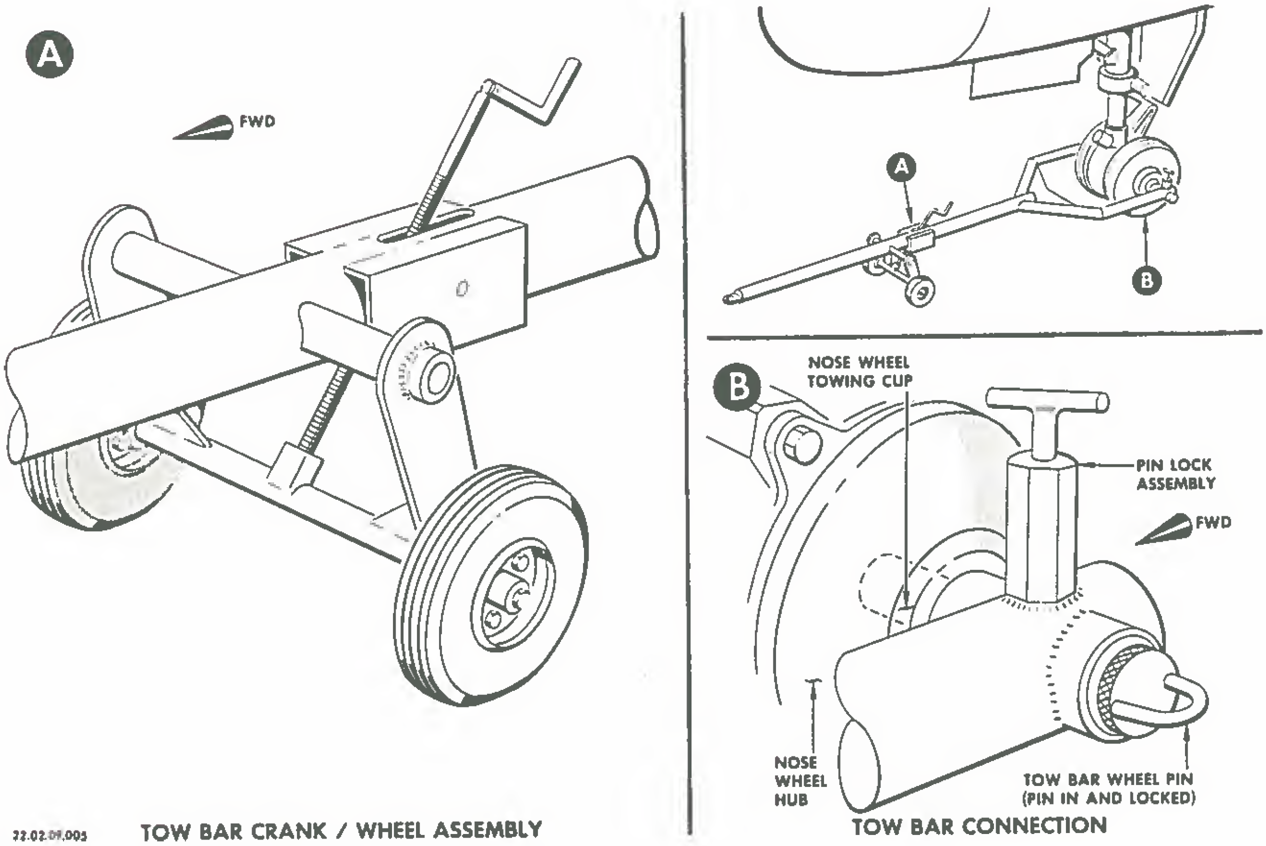
CAUTION: WHEN INSTALLING BALLAST IN THE FORWARD CARGO COMPARTMENT DO NOT EXCEED A MAXIMUM FLOOR LOAD OF 20 POUNDS PER CUBIC FOOT OR 100 POUNDS PER SQUARE FOOT.

2. Nose Landing Gear Towing

Maintenance towing is generally accomplished on a hard, dry surface from the nose landing gear, as shown in Figure 1. With the brake hydraulic line and the skid detector disconnected, the nose wheel steering linkage (torque arms) disconnect permits the nose wheel to swivel 360 degrees; however, towing with the wheels turned at angles greater than 50 degrees will result in scuffing of the main landing gear tires and shall be avoided. Equipment required to tow from the nose landing gear consists of a tow bar (see Figure 2), and a towing tractor equipped with an electric power source. The electric power source is required to operate the airplane auxiliary hydraulic pump for wheel brake operation, and when necessary to furnish power for operation of the airplane air conditioning system and clearance lights. Four men shall be used when towing the airplane in congested areas: one in the flight compartment to operate the wheel brakes and attendant duties, one on the tractor, and one at each wing tip to check wing and tail clearances. The maximum towing load at the nose landing gear must not exceed 27,750 pounds in the fore and aft directions. Permissible loads that may be applied to the nose landing gear vary depending on the turn angle of the nose wheel. As an example, with the nose wheel turned 90 degrees from center, a maximum load of 20,000 pounds must not be exceeded. These load limits must not be exceeded to prevent possible damage to the landing gear strut and fuselage structure.



Towing from the Nose Landing Gear
Figure 1



Airplane Tow Bar
Figure 2

3. Main Landing Gear Towing

Towing from the main landing gear is accomplished by use of integral towing lugs on the front and rear of each main landing gear truck, as shown in Figure 3. The airplane can be towed either forward or backward in mud, snow, or over rough terrain by attaching a manila rope or aircraft cable to each of the forward or aft lugs. The combined strength of the main landing gears will withstand considerable stress and strain as compared to the nose landing gear. The maximum towing load (applied either fore or aft) at each main landing gear must not exceed 20,800 pounds. When towing from the main landing gear make sure that both tractor operators coordinate their towing efforts. Coordination of the tractors will minimize the possibility of applying uneven or twisting loads to the airplane structure and main landing gear. Towing at an angle from the main landing gears shall be avoided.

TEMPORARY REVISION NO. 9-2.

Insert following 9-1-0, Page 5 dated May 24/60.

Add the new figure on sheet 2 of this temporary revision to Section 9-1-0.

TEMPORARY REVISION NO. 9-2.

	CONDITIONS	WEIGHT (POUNDS)	ARM (STATION)	"A"	"B"
1.	Certified Weight Empty (CWE)	83,700	843.9	22	---
2.	CWE less one inbd. engine	80,050	849.6	15	---
3.	CWE less two inbd. engines	76,400	856.1	7	500
4.	CWE less four engines	69,100	851.7	11	---
5.	CWE less two inbd. engines, electronics compt. empty, fwd. seats removed	75,000	862.4	0	1800
6.	CWE less four engines, electronics compt. empty, fwd. seats removed	67,750	858.6	4	1100
7.	CWE less two inbd. engines, plus full fuel	146,400	844.4	38	---
8.	CWE less four engines, plus full fuel	139,100	841.6	41	---
9.	CWE less two inbd. engines, electronics compt. empty, fwd. seats removed plus full fuel	145,000	847.5	31	---
10.	CWE less four engines, electronics compt. empty, fwd. seats removed, plus full fuel	137,750	844.9	34	---

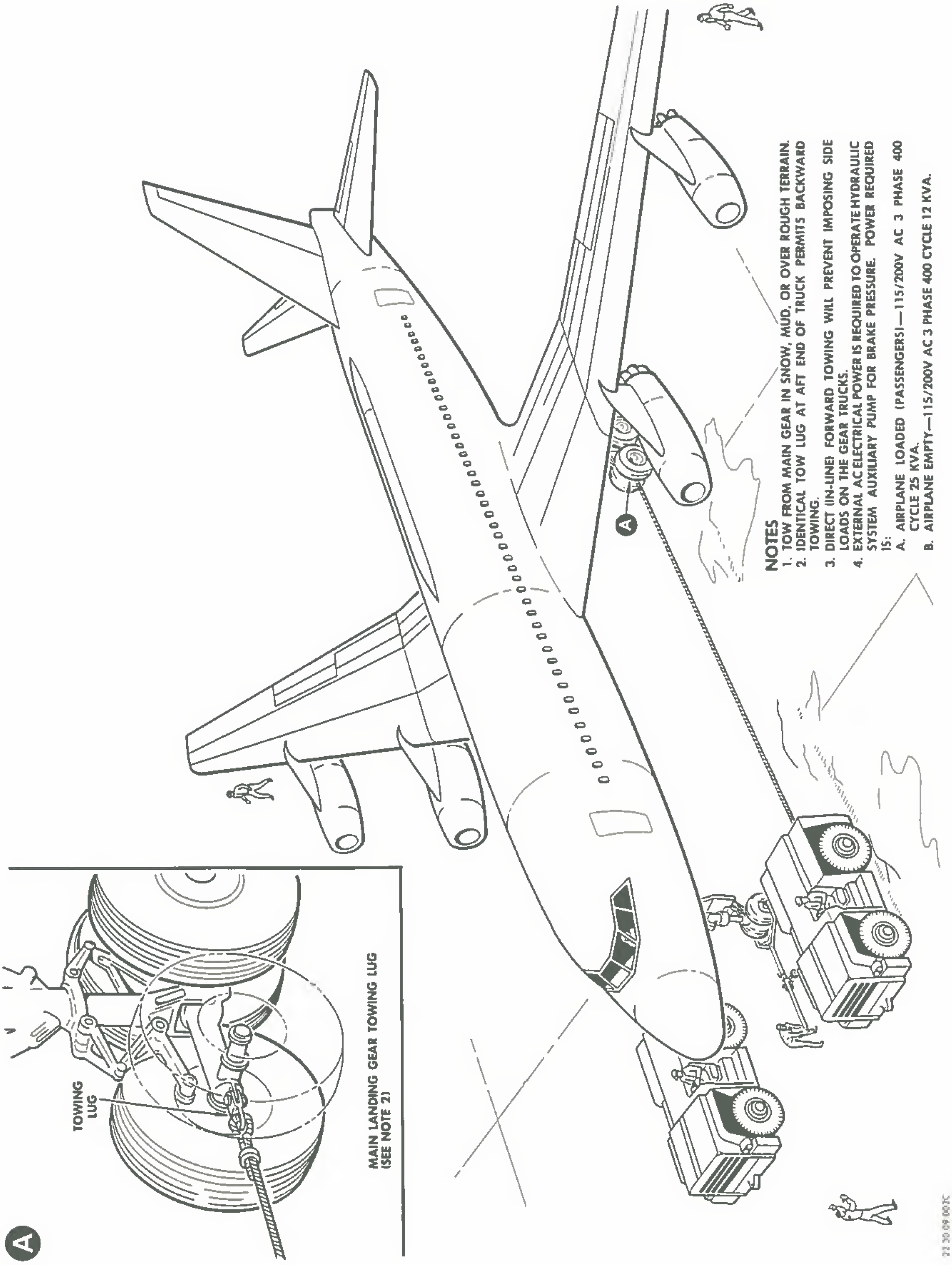
"A" Maximum No. of men (165 lbs. each) allowed aboard airplane (at approximately station 1300) without moving airplane center of gravity (cg) aft of station 863 (no ballast in forward cargo compartment).

"B" Ballast required (evenly distributed about center of forward cargo compartment) to prevent the airplane cg from moving aft of station 863 with ten men aboard at approximately station 1300.

NOTE: The cg (arm) may be moved forward by the addition of fuel to the No. 2 or 3 tanks. Adding 4,000 pounds of fuel to the No. 2 or 3 main tank will move the cg forward one inch or adding 2,500 pounds of fuel to the No. 2 or 3 main and replenishing tank (overwing fueling) will move the cg forward one inch.

CAUTION: WHEN INSTALLING BALLAST, DO NOT EXCEED THE MAXIMUM FLOOR LOADS AS INDICATED IN THE FORWARD CARGO COMPARTMENT. QUANTITY OF FUEL IN OUTBOARD TANKS MUST NEVER EXCEED QUANTITY OF FUEL IN INBOARD TANKS. CENTER OF GRAVITY MUST NEVER BE AFT OF STATION 863.0.

Permissible Center of Gravity Configurations for Conducting Various Maintenance Practices
Figure 4



Towing from the Main Landing Gear
Figure 3

TEMPORARY REVISION NO. 9-3.

Insert facing 9-1-0, Page 201, dated May 24/60.

Page 201, add the following CAUTION immediately after 1. C. Towing Procedure.

CAUTION: DURING MAINTENANCE OR TESTING OF THE AIRPLANE, THE ANTI-SKID SWITCH SHALL BE IN THE OFF POSITION IF THE LANDING GEAR GROUND SAFETY CIRCUIT BREAKERS ARE OPEN. IF THE ANTI-SKID SWITCH IS LEFT ON AND THE GROUND SAFETY CIRCUIT BREAKERS ARE OPEN, THE BRAKES ARE INOPERATIVE. IF THE SWITCH MUST BE ACTUATED TO THE ON POSITION, WHILE THE GROUND SAFETY CIRCUIT BREAKERS ARE OPEN, INSURE THAT THE AIRPLANE IS SECURELY CHOCKED.

TOWING - MAINTENANCE PRACTICES

1. Nose Landing Gear Towing

A. General.

Two maintenance personnel are required when towing the airplane from the nose landing gear--one in the flight compartment for wheel brake operation and attendant duties and one to operate the towing tractor. When towing the airplane in congested areas, two additional personnel are required (one at each wing tip) to check for wing and tail clearances.

B. Equipment Required.

(1) Nose wheel tow bar (P/N 22-J-171).

(2) 20,000 lb/dbp (draw bar pull) or equivalent towing tractor capable of supplying 115/200 volt, 3-phase, 400 cps ac electrical power (tractor must be able to start and stop smoothly).

(3) Nose landing gear down-lock safety pin (Cleveland Pneumatic P/N 9772-200).

(4) Main landing gear down-lock safety pin (2) (Cleveland Pneumatic P/N 9729-150).

(5) Engine inlet duct plug (4) (P/N 22-J-119).

(6) Wheel chocks.

(7) Headset and microphone or headset-microphone combination for communication between tractor operator and the man in flight compartment.

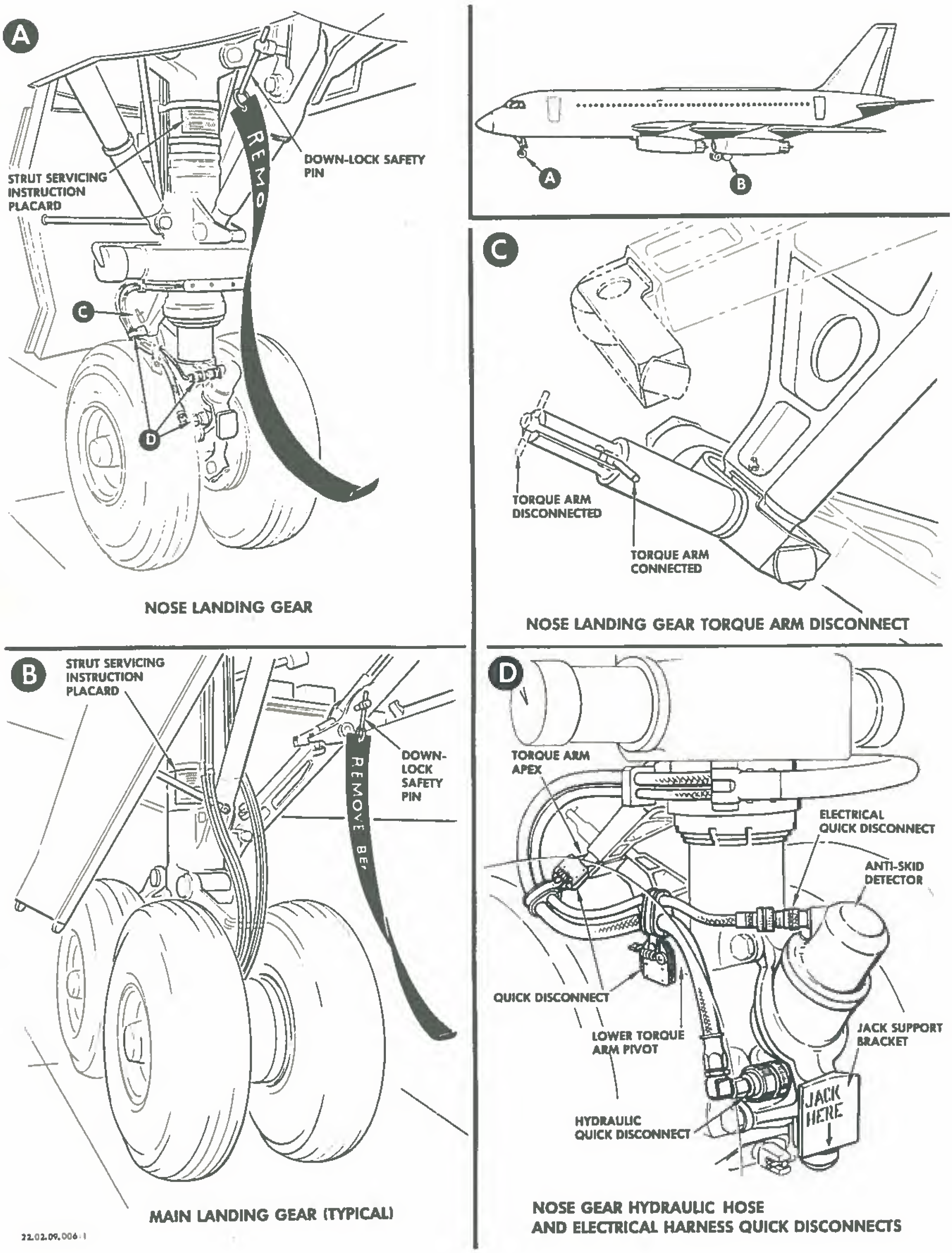
C. Towing Procedure (see Figure 201). — Figure Detail

CAUTION: PLACE THE ANTI-SKID SWITCH IN THE OFF POSITION IF THE LANDING GEAR GROUND SAFETY CIRCUIT BREAKERS ARE OPEN. IF THE ANTI-SKID SWITCH IS IN THE ON POSITION AND THE LANDING GEAR GROUND SAFETY CIRCUIT BREAKERS ARE OPEN, THE AIRPLANE BRAKES ARE INOPERATIVE.

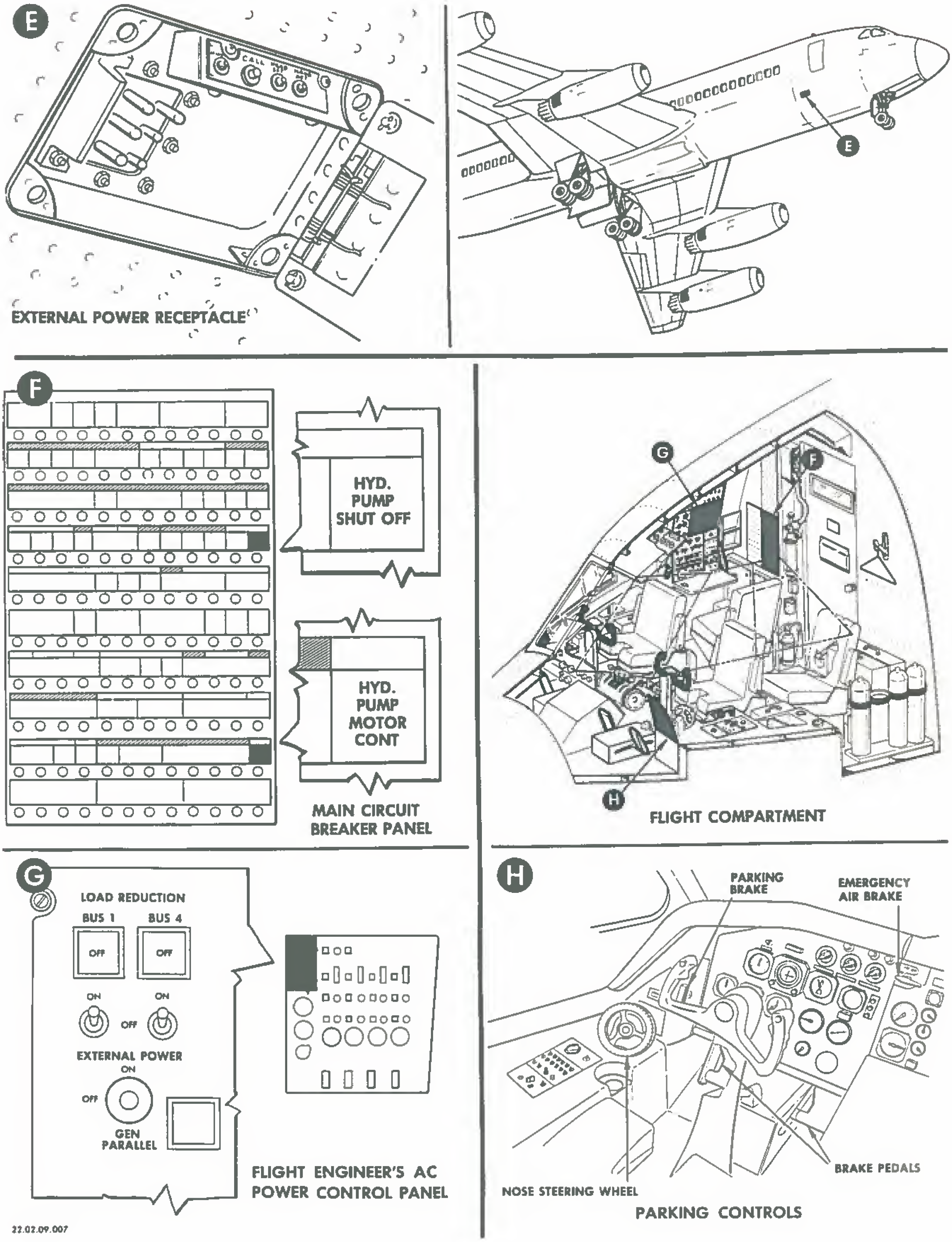
(1) Clear immediate area around airplane of all equipment and material.

(2) Install engine inlet duct plugs (refer to Chapter 71, POWER PLANT).

(3) Install nose and main landing gear down-lock safety pins. — A,B



Towing Provisions
Figure 201 (Sheet 1 of 2)



Towing Provisions
Figure 201 (Sheet 2 of 2)

	Figure Detail
(4) Check that landing gear shock struts are properly inflated according to instruction placards installed on strut assemblies.	A,B

CAUTION: DO NOT ATTEMPT TO TOW FROM THE NOSE LANDING GEAR WHEN THERE ARE LESS THAN 1.5, OR MORE THAN 10.5 INCHES OF CHROME VISIBLE ON THE NOSE LANDING GEAR SHOCK STRUT. DAMAGE CAN OCCUR TO CYLINDER BEARING AND NOSE WHEEL CENTERING CAM.

(5) Check that tires are properly inflated to their respective service pressures (refer to Chapter 12, SERVICING).	
(6) Assign one man to flight compartment to operate airplane brakes.	
(7) Connect interphone communication headset and microphone to jackbox in nose landing gear wheel well (refer to Chapter 23, COMMUNICATIONS).	
(8) Disconnect nose landing gear steering linkage (torque arms) at quick-disconnect pin at apex of torque arms by pulling "tee" handle to release torque arms.	C
(9) Disconnect hydraulic nose and electrical harness quick-disconnect at apex of torque arms. Pull spring-loaded trigger down and forward, push slide portion of quick-disconnect off of quick-disconnect support bracket.	D

NOTE: Steps (10) and (11) following need not be performed if the nose wheel is to be turned at angles less than 90 degrees from the airplane longitudinal axis.

(10) Disconnect hydraulic hose and electrical harness quick-disconnect support at lower torque arm pivot point. Pull spring-loaded trigger down and aft, push slide portion of quick-disconnect off of quick-disconnect support bracket.	D
(11) Disconnect individual hydraulic hose and electrical harness quick-disconnects at anti-skid detector and jack support bracket. Turn quick-disconnect counterclockwise and pull out to disengage.	D

NOTE: Protect disconnected hydraulic line and adapter fitting from contamination.

CAUTION: WHEN RECONNECTING QUICK-DISCONNECT FITTING, CARE SHOULD BE TAKEN TO INSURE PROPER ALIGNMENT OF THE NIPPLE AND SOCKET ENDS. THE "RED BAND" INDICATOR SHOWS THE PROPER COUPLING ALIGNMENT.

Figure Detail

(12) Connect tow bar to nose landing gear and towing tractor. Pull out tow bar wheel pins, position tow bar around nose wheel and insert and lock tow bar wheel pins in towing cups on nose wheel axle (see Figures 1 and 2).

(13) Connect external power to external power receptacle at forward right side of airplane at station 365 (refer to Chapter 24, ELECTRICAL POWER). E

NOTE: Minimum power requirements for towing are:

Loaded airplane (passengers)--115/200 volt, 3-phase, 400 cps 25 kva.

Unloaded airplane (no passengers)--115/200 volt, 3-phase, 400 cps 12 kva.

(14) Close HYD PUMP MOTOR CONT and HYD PUMP SHUTOFF circuit breakers on the main circuit breaker panel. Ensure that three ELEC HYD PUMP POWER limiters are installed. F

(15) Place EXTERNAL POWER control switch on flight engineer's ac power control panel in the ON position. Actuate the HYD PUMP switch to ON. G

(16) Perform operational check of wheel brake hydraulic system before towing (refer to Chapter 32, LANDING GEAR). Check for 3000 (±100) psig pressure indication on EMERGENCY AIR BRAKE pressure gage.

(17) Disconnect static ground lines from landing gear.

(18) Release parking brake by applying toe pressure to brake pedals. H

(19) Proceed with towing operations while observing the following:

NOTE: When towing is being accomplished at night, the airplane position lights, pilots' instrument panel floodlights and the flight compartment dome lights shall be turned on (refer to Chapter 33, LIGHTS).

CAUTION: DO NOT EXCEED MAXIMUM SPECIFIED TOWING LIMITS WHEN TOWING FROM NOSE LANDING GEAR. MAXIMUM LIMITS ARE:

NOSE WHEEL 45 DEGREES FROM CENTER--28,300 POUNDS
NOSE WHEEL 90 DEGREES FROM CENTER--20,000 POUNDS
NOSE WHEEL CENTERED FORE AND AFT---30,600 POUNDS

(a) Maintain wheel chocks readily available during towing for emergency stops and/or in case airplane or tractor brakes fail.

CAUTION: USE EXTREME CARE WHEN TOWING THE AIRPLANE IN CONGESTED AREAS.

(b) Avoid turning airplane at angles greater than 50 degrees to prevent excessive scuffing of main landing gear tires; always use largest turning radius possible.

(c) Park airplane in the best possible position to avoid the necessity for tight turns.

2. Main Landing Gear Towing

A. General.

Six maintenance personnel are required when towing from the main landing gear--one in the flight compartment for wheel brake operation and attendant duties, one to handle the nose landing gear tow bar to steer the airplane, one operator for each of the two towing tractors, and one at each wing tip to check for wing and tail clearances.

B. Equipment Required.

NOTE: The following equipment is required in addition to that required for nose gear towing procedure:

(1) Additional towing tractor.

(2) Two lengths of manila rope or aircraft cable capable of pulling the weight of the airplane.

(3) Headset and microphone or headset-microphone combination.

C. Towing Procedure.

(1) Perform steps (1) through (11) of Nose Landing Gear Towing procedure.

(2) Connect tow bar to nose landing gear. Pull out tow bar wheel pins, position tow bar around nose wheel and insert and lock tow bar wheel pins in nose wheel cups (see Figure 2).

(3) Connect manila rope or aircraft cable to fore or aft towing lugs (depending on direction airplane is to be towed) on each main landing gear truck (see Figure 3).

(4) Connect interphone communication headsets and microphones to jackboxes on inboard side of each inboard engine pylon (refer to Chapter 23, COMMUNICATIONS).

TEMPORARY REVISION NO. 9-4.

Insert facing 9-1-0, Page 206, dated May 24/60.

Page 206, add the following CAUTION immediately after 2. C. Towing Procedure.

CAUTION: DURING MAINTENANCE OR TESTING OF THE AIRPLANE, THE ANTI-SKID SWITCH SHALL BE IN THE OFF POSITION IF THE LANDING GEAR GROUND CIRCUIT BREAKERS ARE OPEN. IF THE ANTI-SKID SWITCH IS LEFT ON AND THE GROUND SAFETY CIRCUIT BREAKERS ARE OPEN, THE BRAKES ARE INOPERATIVE. IF THE SWITCH MUST BE ACTUATED TO THE ON POSITION, WHILE THE GROUND SAFETY CIRCUIT BREAKERS ARE OPEN, INSURE THAT THE AIRPLANE IS SECURELY CHOCKED.

(5) Perform steps (13) through (18) of Nose Landing Gear Towing Procedure.

(6) Using the nose landing gear tow bar for steering, proceed with towing operations while observing the following:

NOTE: When towing is being accomplished at night, the airplane position lights, pilots' instrument panel floodlights and the flight compartment dome lights shall be turned on (refer to Chapter 33, LIGHTS).

CAUTION: DO NOT EXCEED THE MAXIMUM PERMISSIBLE FORE AND AFT TOWING LOAD LIMIT OF 20,800 POUNDS AT EACH MAIN LANDING GEAR.

(a) Maintain wheel chocks readily available during towing for emergency stops and/or in case airplane or tractor brakes fail.

CAUTION: USE EXTREME CARE WHEN TOWING AIRPLANE IN CONGESTED AREAS.

(b) Avoid turning airplane with nose wheel turned more than 50 degrees from center to prevent excessive scuffing of main landing gear tires; always use the largest turning radius possible.

NOTE: Do not turn airplane with one landing gear stationary. All wheels shall be rolling during any maneuver.

(c) Coordinate movement of both towing tractors to prevent imposing uneven or twisting loads on airplane landing gear trucks and airplane structure.

(d) Maintain a steady strain on towing ropes or cables to prevent jerking the airplane. Also, use extreme care to prevent airplane from overriding towing tractors.

TAXIING - DESCRIPTION AND OPERATION

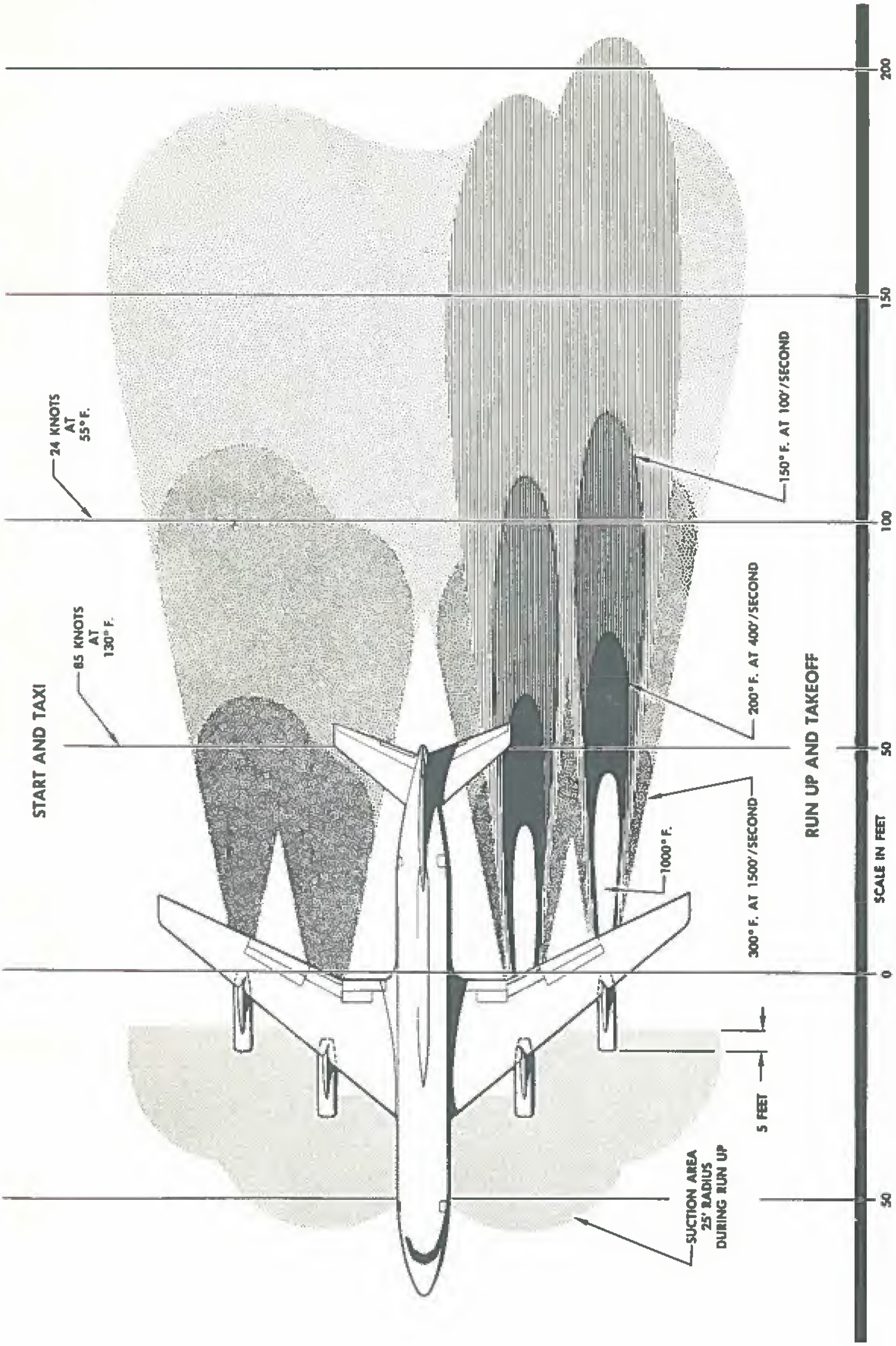
1. General

Taxiing procedures are utilized whenever the airplane must be moved from one area to another under its own power. The hydraulic system must be energized to supply hydraulic power to operate the nose wheel steering system and the wheel brakes.

2. Normal Taxiing Procedures

One, two, three or four engines, or any combination of engines can be used for taxiing. The engine or engines used for taxiing depends on the circumstances or as dictated by operator standard practices. To initiate a taxi roll, a minimum power setting which is sufficient to gain rolling momentum shall be used. Caution must be exercised when advancing power so as not to exceed the minimum thrust required since blast, heat and noise levels increase very rapidly when above 75 percent. Figure 1 illustrates the heat and blast danger areas of the engines.

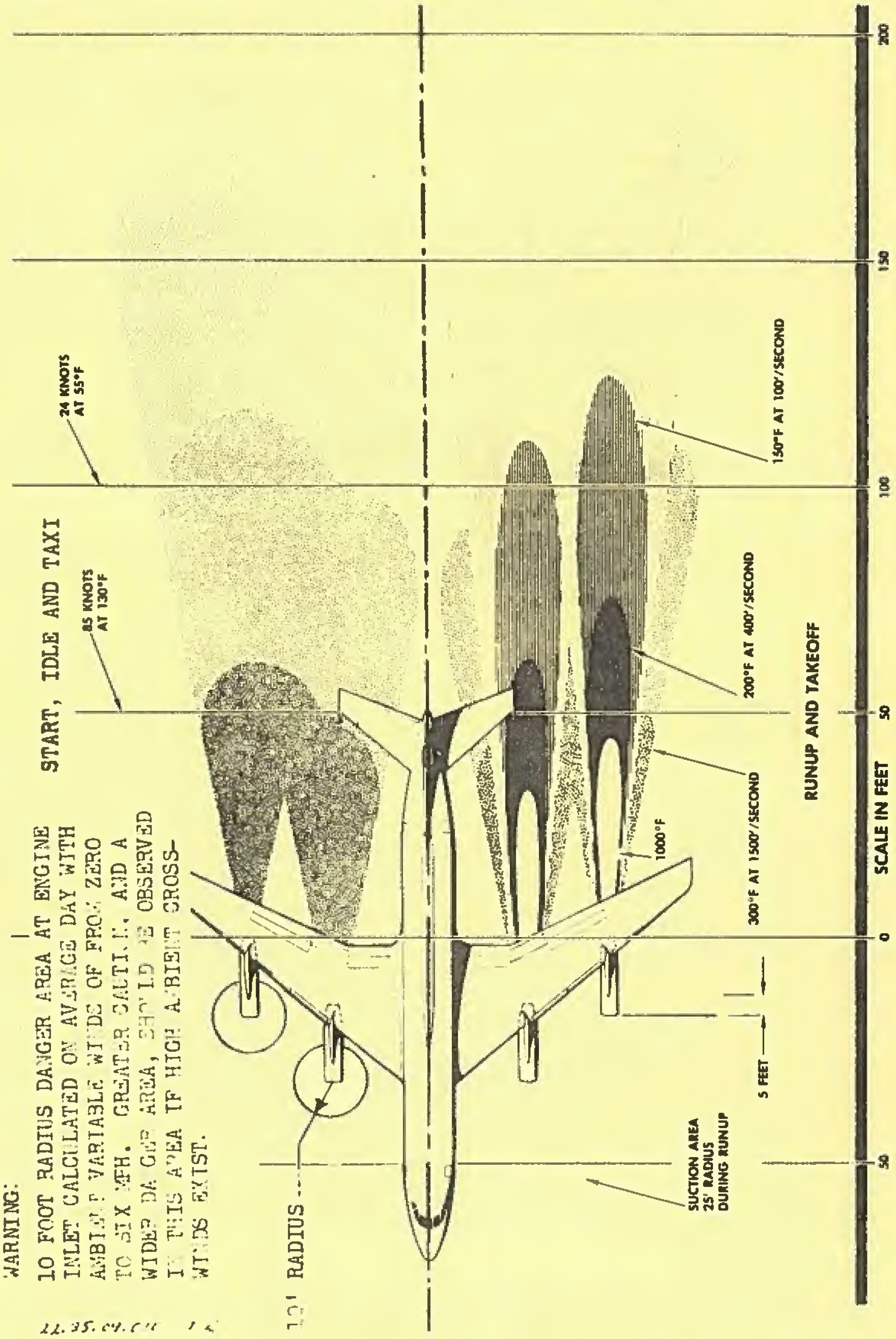
The nose wheel steering system is rigged with mechanical stops which prevent turning the nose wheel more than 70 degrees to the left or right of neutral or center. With the nose wheel at an angle of 70 degrees, either left or right, the wing tip describes an arc of 84 feet five inches about the pivot point, as shown in Figure 202.



Engine Inlet and Exhaust Danger Areas
Figure 1

TEMPORARY REVISION NO. 9-5.
Insert facing 9-2-0, Page 2 basic (no date).

This illustration supersedes the illustration on page 2.



Engine Inlet and Exhaust Danger Areas
Figure 1

TAXIING - MAINTENANCE PRACTICES

1. Taxiing

   A. The following practices must be observed at all times during taxiing procedures:

      (1) Station ground control man in front of airplane within visual range of cockpit (ground man must be able to observe immediate area around airplane).

      (2) Do not attempt to taxi airplane away from parking or maintenance areas without proper direction from ground control man.

      NOTE: Communications between the ground control man and the cockpit shall be standard, operator-approved hand signals.

      WARNING: GROUND CONTROL MAN SHALL NOT ALLOW THE AIRPLANE TO APPROACH HIM CLOSER THAN 50 FEET AT ANY TIME WITHOUT EXECUTING THE SIGNAL TO TURN OR STOP.

      (3) Use only sufficient power to gain rolling momentum when taxiing airplane away from other airplanes, structures, or congested areas.

      (4) When it is necessary to turn the airplane immediately after taxiing from parking or congested areas, obtain the required rolling momentum in a straight forward direction, reduce power, and accomplish the turn with power reduced to minimum.

      WARNING: DO NOT TAXI AN AIRPLANE IN SUCH A MANNER THAT ENGINE EXHAUST BLAST CAN CAUSE INJURY TO PERSONNEL OR DAMAGE ADJACENT PROPERTY AND AIRPLANES (SEE FIGURE 1 FOR ENGINE INTAKE AND EXHAUST DANGER AREAS).

      CAUTION: EXERCISE EXTREME CARE WHEN TURNING AIRPLANE TO ASSURE SUFFICIENT CLEARANCE WITH ADJACENT AIRPLANES AND STRUCTURES (SEE FIGURE 201 FOR MINIMUM TURNING LIMITS).

      WARNING: DO NOT ALLOW PERSONNEL OR VEHICLES TO APPROACH AN ON-COMING TAXIING AIRPLANE OR PASS TO THE REAR OF THE AIRPLANE WITHIN 200 FEET.

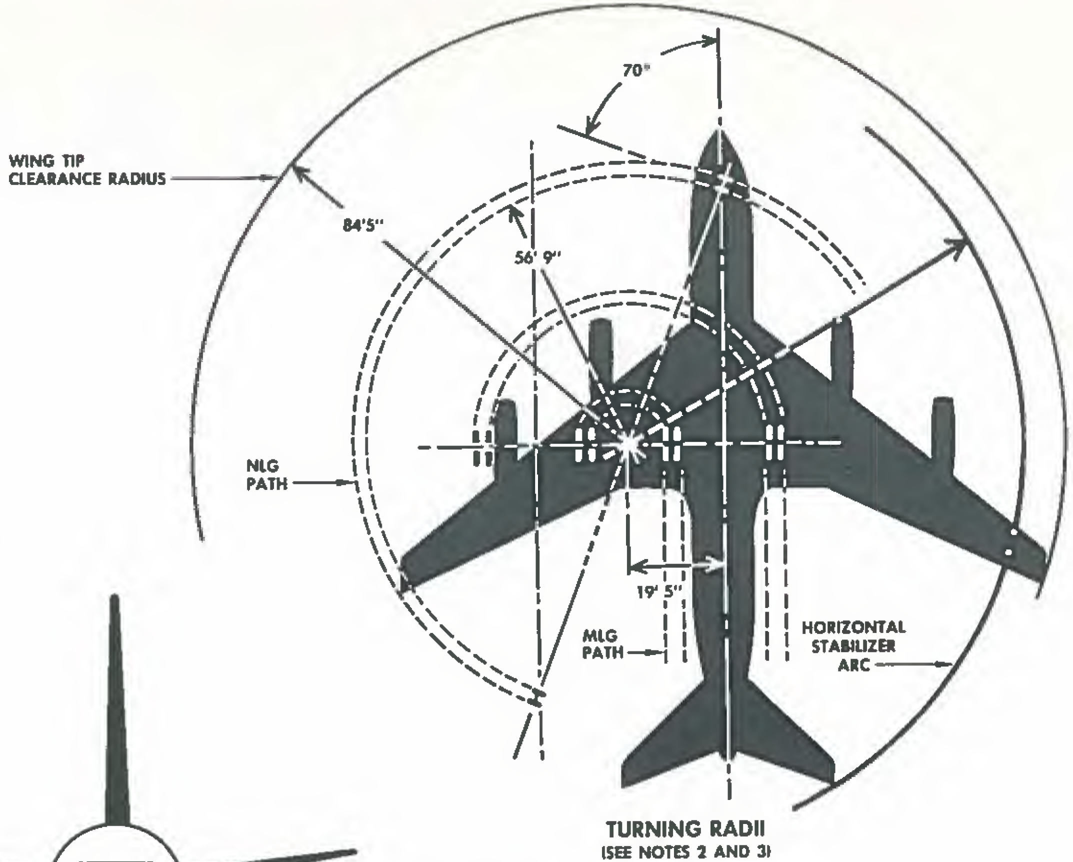
NOTES

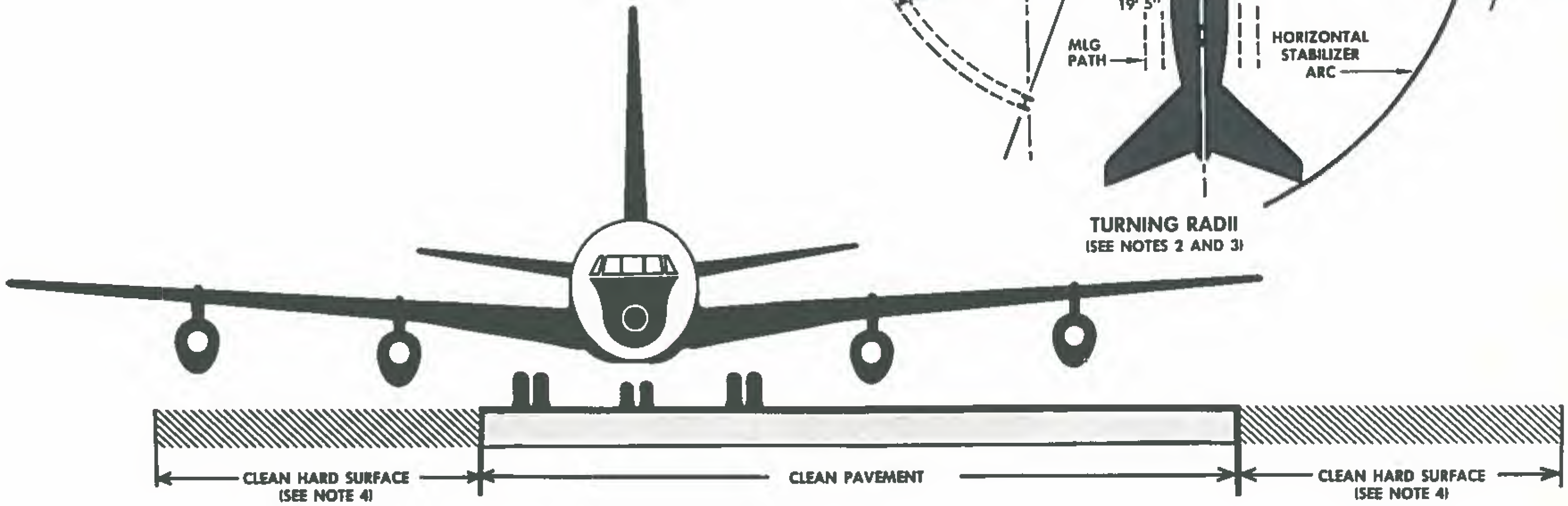
1. MAXIMUM NOSE WHEEL STEERING ANGLE IS 70°.

CAUTION

TURNING ANGLES GREATER THAN 50° CAN RESULT IN SCUFFING OF THE MAIN GEAR TIRES.

2. TURNING DETAIL ILLUSTRATES MINIMUM WING AND TAIL CLEARANCE RADII FOR AIRPLANE EXECUTING A 180° TURN AT MAXIMUM NOSE WHEEL STEERING ANGLE OF 70°.
3. AREA REQUIRED FOR TURNING AIRPLANE VARIES WITH DEGREE OF NOSE WHEEL STEERING ANGLE.
4. CLEAN HARD SURFACE DESIRABLE TO MINIMIZE POSSIBILITY OF LOOSE DEBRIS ENTERING ENGINES.





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Taxiing Clearance
Figure 201

LIST OF EFFECTIVE PAGES

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PARKING AND MOORING

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Chapter 10

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Chapter 10

PARKING AND MOORING - DESCRIPTION AND OPERATION

1. General

Parking and mooring of the airplane is accomplished whenever it is not in flight status, whether for a short or an extended period of time. Care must be exercised that the airplane is placed in an area accessible to fire fighting equipment and servicing personnel. Protective covers must be installed in localities where weather extremes are prevalent. Mooring lines and equipment should be utilized whenever the airplane is left unattended for extended periods.

PARKING AND MOORING - MAINTENANCE PRACTICES

1. Adjustment/Test Ground Resistance Check

A. General.

To determine that the ground rods and/or electrodes are effective, the following ground resistance check shall be performed periodically.

B. Equipment Required.

(1) Ohmmeter.

C. Check Procedure.

WARNING: IN STEP (1) FOLLOWING, MAKE THE CONNECTION AT THE LANDING GEAR FIRST--AT THE GROUND ROD LAST.

(1) Connect static ground lines from the landing gear to approved type grounds.

(2) Connect ohmmeter between an unpainted surface of the wheel well and the ground rod or electrode and record reading of ohmmeter; reading shall not exceed 0.5 ohms.

(3) With ohmmeter still connected per step (2) preceding, remove one static ground line from a ground rod or electrode and record reading of ohmmeter; reading shall not exceed 15 ohms.

(4) Replace static ground line removed in step (3) preceding and record reading of ohmmeter; reading shall not exceed 0.5 ohms.

(5) Repeat steps (2), (3) and (4) for each grounding location.

(6) Replace or repair faulty ground rods or electrodes.

PARKING - DESCRIPTION AND OPERATION

1. General

When parking an airplane for a short time, for servicing or some other reason, it should be positioned so that sufficient clearance is available for servicing equipment or fire truck access. The parking brakes should be set by depressing the brake pedals and pulling the parking brake handle on. Always install landing gear down-lock safety pins, wheel chocks, and static ground lines.

AIRPLANE PARKING - MAINTENANCE PRACTICES

1. Parking

A. General.

Parking procedures are used when the airplane is to be idle for short durations and also when adverse or threatening weather conditions are not imminent.

B. Equipment Required.

(1) One nose landing gear down-lock safety pin (Cleveland Pneumatic P/N 9772-200).

(2) Two main landing gear down-lock safety pins (Cleveland Pneumatic P/N 9729-150).

(3) Six wheel chocks.

(4) Three static ground lines.

C. Parking Procedure.

(1) Position airplane in parking area allowing adequate space between other aircraft and structures for easy access of fire fighting and servicing equipment.

CAUTION: PARK AIRPLANE IN THE BEST POSSIBLE POSITION TO AVOID TIGHT TURNS. PARKING IN TIGHT TURNS CAN DAMAGE THE LANDING GEAR STRUT SEALS. ALSO, ALLOW SUFFICIENT DISTANCE FORE AND AFT OF THE AIRPLANE FROM OTHER AIRCRAFT TO MINIMIZE THE POSSIBILITY OF DAMAGE FROM JET AND HEAT BLAST.

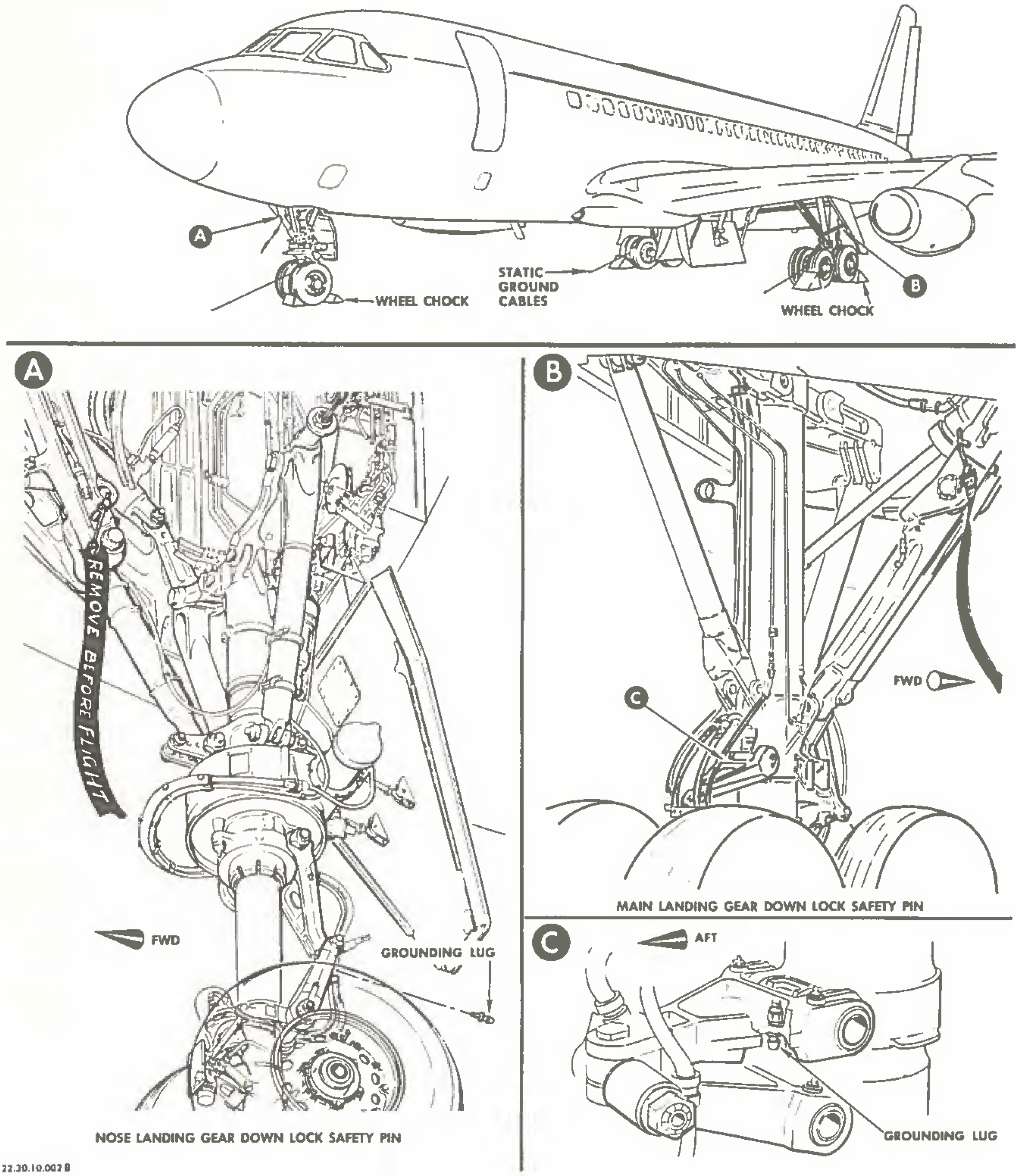
(2) Place wheel chocks fore and aft of main and nose landing gear.

(3) Install landing gear down-lock safety pins (see Figure 201).

NOTE: The landing gear down-lock safety pins are stowed in the pin stowage bag located on the aft right bulkhead of the flight compartment immediately inside the flight compartment access door.

NOTES

1. ON ICE OR SNOW COVERED SURFACES, USE SAND BAGS IN LIEU OF CHOCKS.
2. ALWAYS INSTALL LANDING GEAR DOWN LOCK SAFETY PINS.
3. AIRPLANE SHOULD BE MOORED IN ADDITION TO CHOCKING THE WHEELS WHEN PARKED OVERNIGHT OR FOR AN EXTENDED PERIOD.



Parking Requirements
Figure 201

(4) Set parking brakes by applying pressure to the brake pedals and at the same time pull the parking brake handle to the "full out" position (see Figure 202).

NOTE: Do not set the parking brakes if low temperatures prevail as brakes may freeze due to the accumulation of moisture. Also, do not set the brakes if they are hot from excessive use. Allow the brakes to cool before setting.

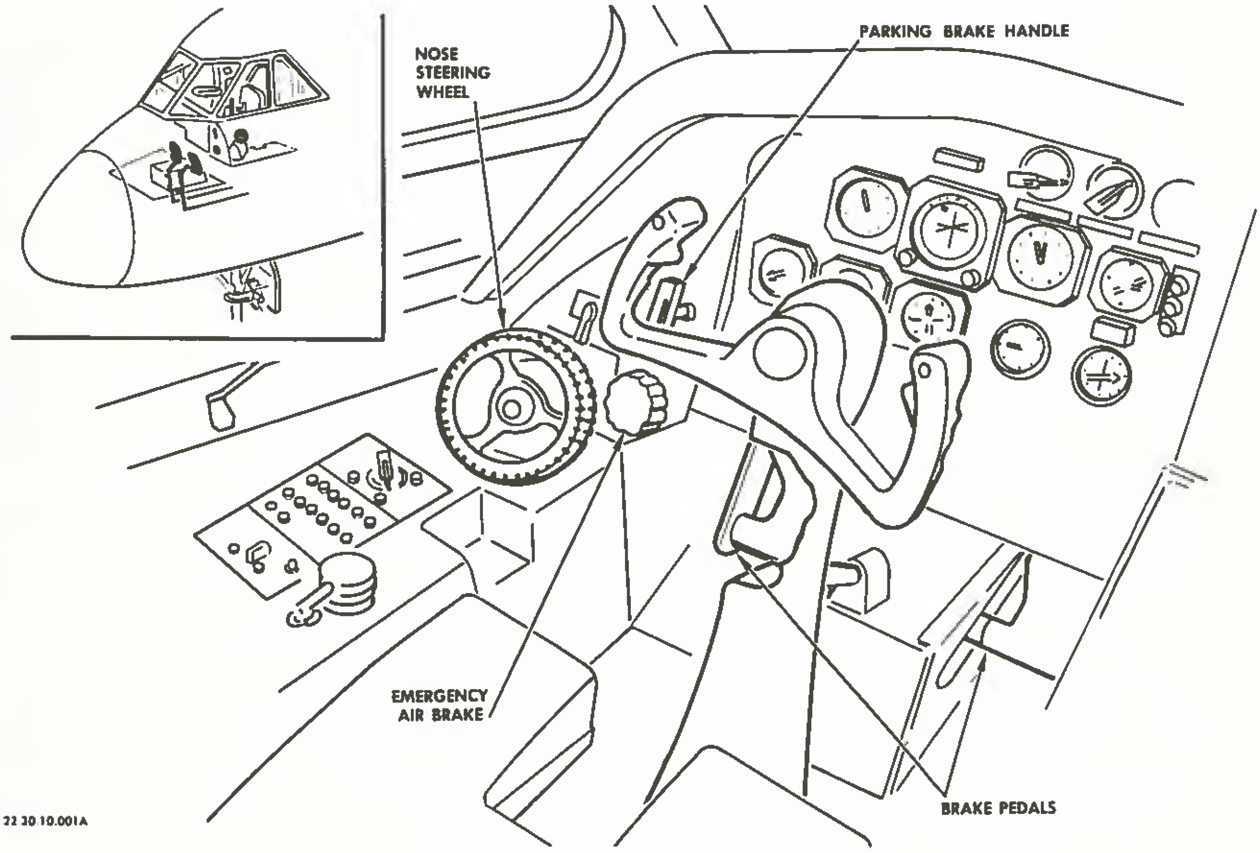
WARNING: IN STEP (5) FOLLOWING, MAKE THE CONNECTION AT THE LANDING GEAR FIRST AND AT THE GROUNDING ROD LAST.

(5) Connect a static ground line from the nose and each main landing gear grounding lug to approved type ground rods and perform static ground resistance check (refer to 10-0, ADJUSTMENT/TEST).

NOTE: Grounding lugs are installed on the scissors assembly of the nose landing gear and both main landing gear of the following airplanes: N8808E through N8813E. Grounding lugs will be installed on airplanes N8801E, N8802E, N8803E, N8805E, N8806E and N8807E per Convair Service Bulletin 32-14.

(6) If extremely hot weather exists, open all doors and flight compartment sliding windows to allow for the dissipation of heat.

NOTE: Do not open the passenger cabin emergency exit doors.



Parking Controls
Figure 202

MOORING - DESCRIPTION AND OPERATION

1. General

Mooring procedures are used when the airplane is to be idle for extended periods of time and when adverse weather and/or high winds are expected. Mooring provisions are provided on the forward and aft main gear trucks and on the aft fuselage tail skid. Tie-down is accomplished by utilizing manila rope or aircraft cable between the mooring lugs and the tie-down points on the ramp. Integral control surface gust dampers are provided in the flight control system to protect the airplane control surfaces from wind damage. These dampers are constantly engaged and do not interfere with normal control surface movement.

When the airplane is moored for extended periods the wheels should be rotated every 48 hours to prevent the tires from developing flat spots. Also, if the airplane is parked on snow or ice covered ground a double thickness of water-proof paper, or approximately 1/2-inch of sand, should be placed under the wheels to prevent them from freezing to the ground. Should the tires freeze to the ground, the application of heat to the tires from a heat cart can be used judiciously to free them. When extreme cold weather exists, the battery should be removed from the airplane and stored in a warm area. If extreme hot weather exists, all doors (except the passenger cabin emergency exit doors) and flight compartment sliding windows should be opened to allow for the dissipation of heat.

AIRPLANE MOORING - MAINTENANCE PRACTICES

1. Mooring (see Figure 201)

A. Equipment Required.

NOTE: The following equipment is required for mooring in addition to the equipment used for parking procedures.

(1) Sandbags (used in lieu of chocks on snow or ice covered ground).

(2) Manila rope mooring lines (3000 pound pull test) or 1/4-inch aircraft cable and clevis.

(3) Windshield rain clearing nozzle cover (P/N 22J116).

(4) Engine tailpipe cover (4) (P/N 22J118).

(5) Engine inlet duct plug (4) (P/N 22J119).

(6) Windshield snow and ice protection cover.

(7) Pitot tube covers.

(8) Wheel protection covers.

B. Mooring Procedure.

(1) Perform parking procedure (refer to 10-1-0, MAINTENANCE PRACTICES).

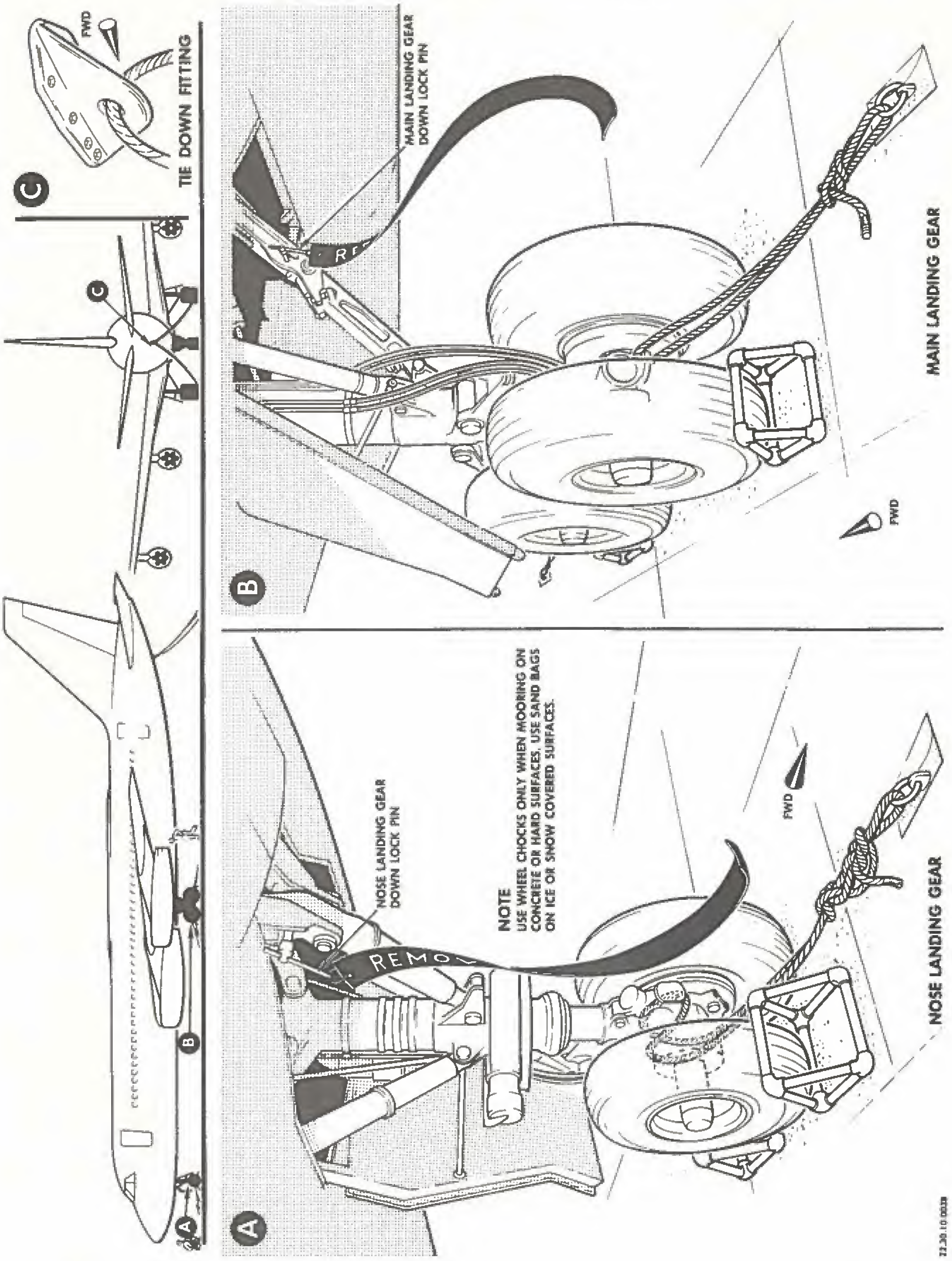
(2) Attach mooring line (or aircraft cable) to the fuselage tail skid.

CAUTION: WHEN USING MANILA ROPE FOR MOORING LINE ALLOW SUFFICIENT SLACK TO COUNTERACT SHRINKAGE IN WET WEATHER. SHRINKAGE OF THE ROPE CAN CAUSE UNDUE STRESS IN THE AIRPLANE STRUCTURE.

CAUTION: IF HIGH WINDS PREVAIL OR ARE FORECAST, TURN AIRPLANE INTO THE WIND AND ATTACH ADDITIONAL MOORING LINES OR CABLES TO THE LANDING GEAR. FUEL AIRCRAFT TANKS (REFER TO CHAPTER 12, SERVICING) AND TRIM HORIZONTAL STABILIZER TO 0 DEGREE.

(3) Install engine duct plug and tailpipe covers (refer to Chapter 71, POWER PLANT).

(4) Install windshield ice, snow and rain clearing nozzle protective covers.

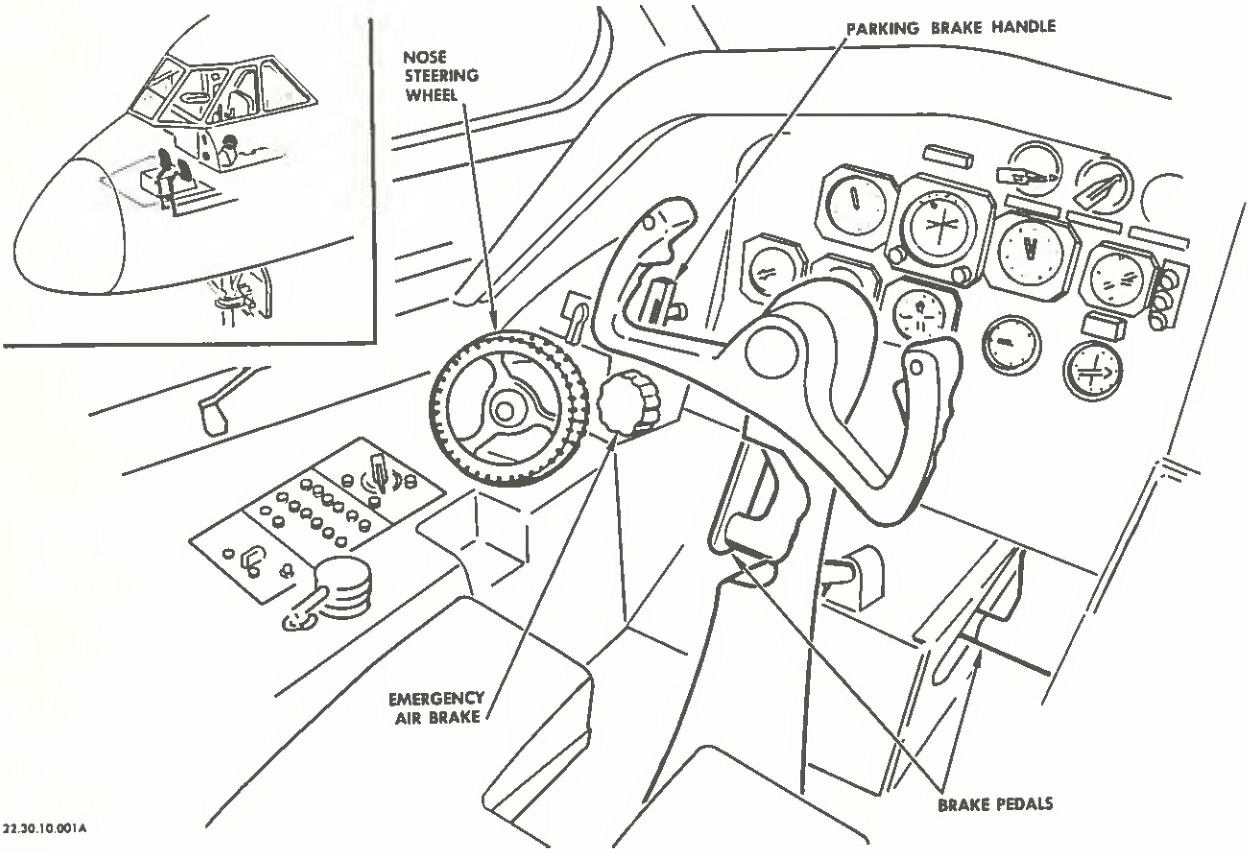


Mooring Points
Figure 201

(5) Install pitot tube covers.

(6) Install wheel protection covers.

(7) Ascertain that all doors and windows are closed securely.



Parking Controls
Figure 202

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*Pages revised, added, or deleted by this revision.

Chapter 12
SERVICING

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SERVICING

1. General

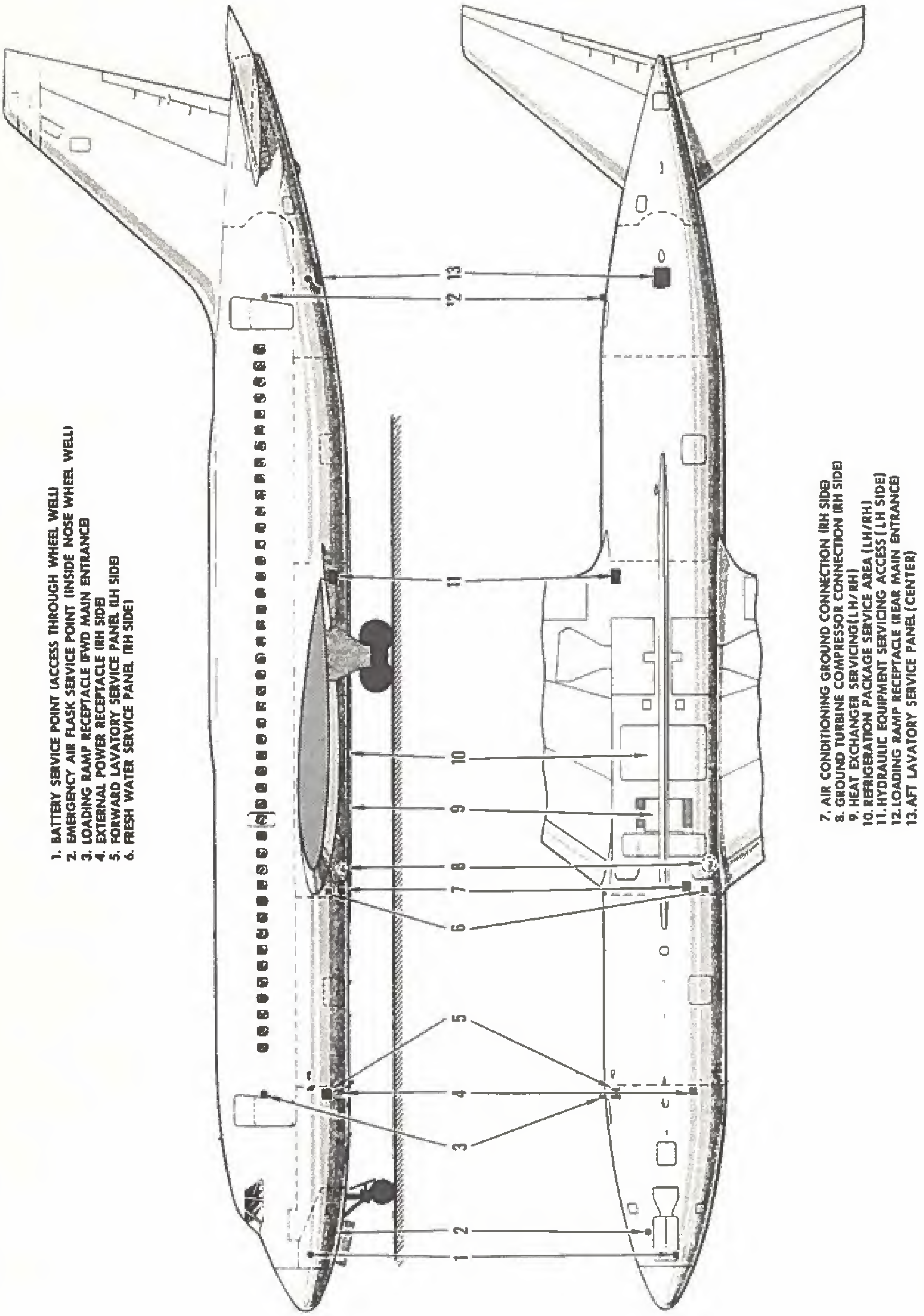
The airplane can be serviced in a minimum of time with little interference between the crews servicing the operating systems, buffets, and lavatories, and those loading and unloading the cargo areas. Most servicing of the operational systems and of the compartments is accomplished from the right side of the airplane: the left side, except for the forward lavatory and fuel and engine servicing, is reserved for passenger and flight crew enplaning and deplaning.

Due to the size of the airplane and the noise level sometimes encountered at airports, and integral interphone communications system is installed to accelerate and assist in the servicing. Interphone stations are provided for communication between the flight compartment and the airplane's various servicing areas.

Night time servicing is accelerated by lighting equipment located in vital areas of the airplane. Passenger loading ramps, cargo areas, buffet servicing platforms, and the wheel wells are illuminated. Lights installed in the sides of the fuselage also assist in ground servicing by illuminating the wing leading edges and engines.

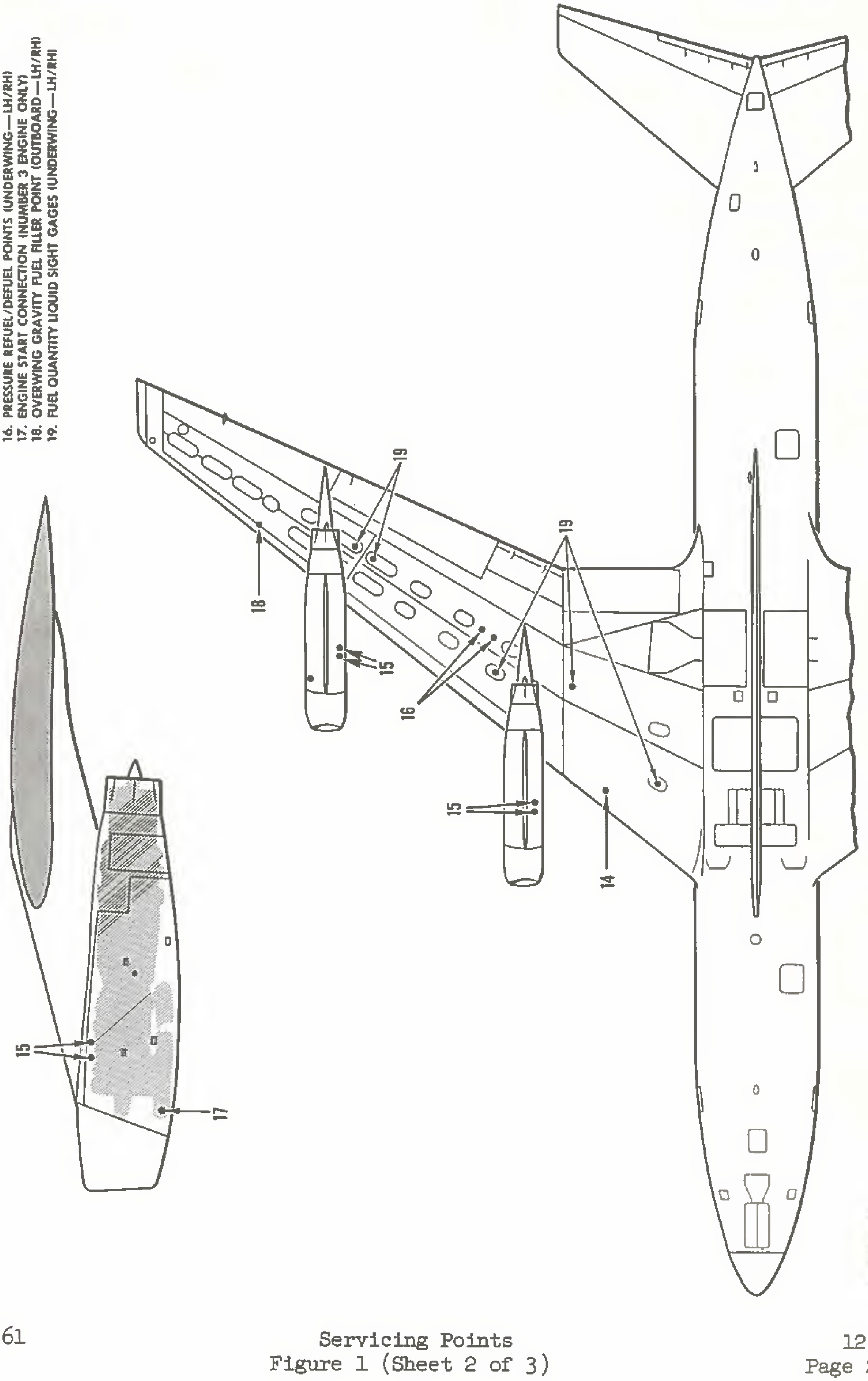
Instruction placards or decals are permanently attached to the inner surfaces of service panel access doors and on or near components which require regular servicing. These placards or decals assist maintenance personnel in determining the correct types of fluids, pressures and quantities required for proper servicing of the respective systems.

Figures 1 and 2 show the various servicing points and access doors on the airplane; reference should be made to these figures for servicing locations mentioned in this chapter.

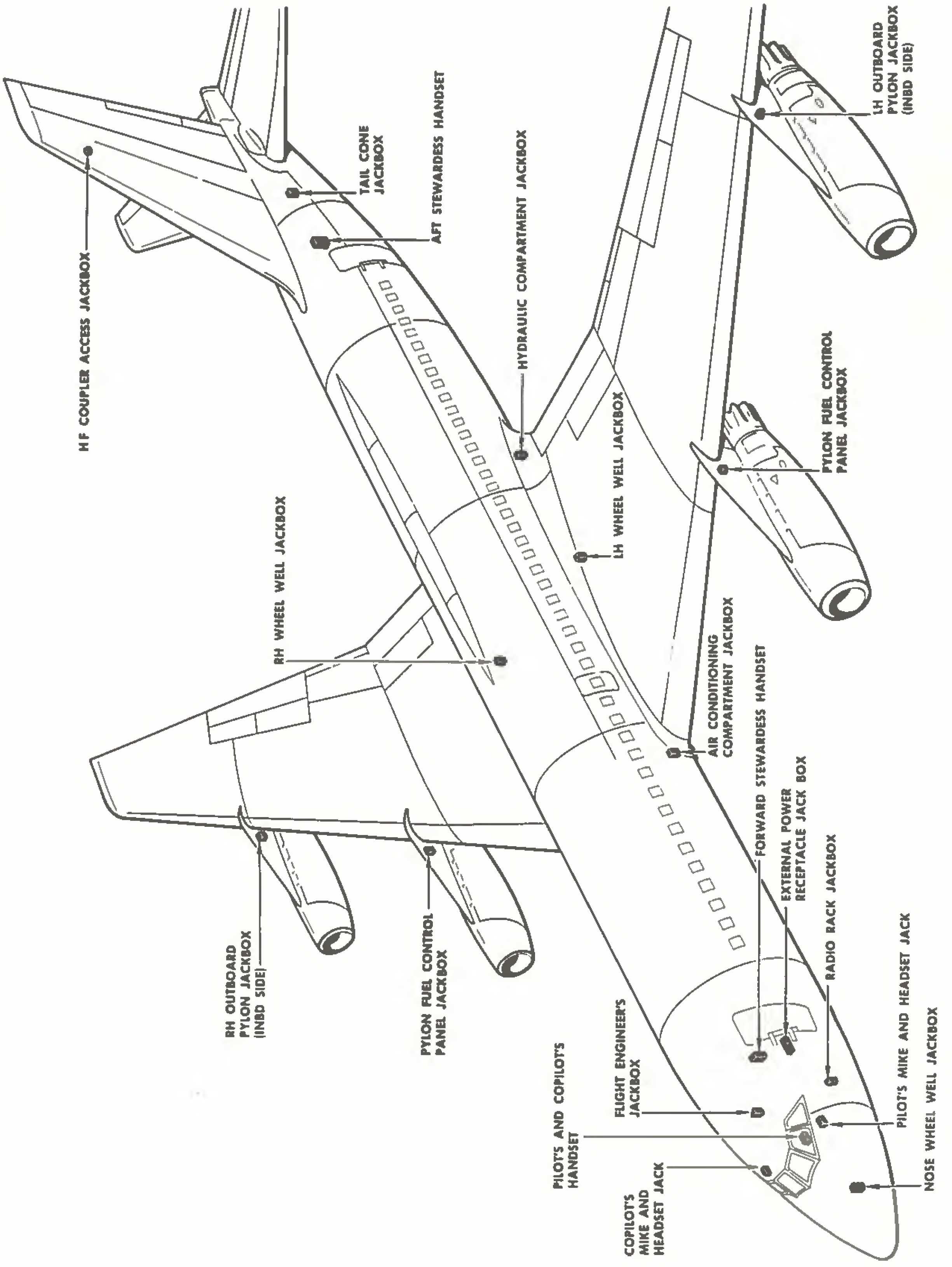


Servicing Points
Figure 1 (Sheet 1 of 3)

14. OVERWING GRAVITY FUEL FILLER POINT (INBOARD—LH/RH)
15. ENGINE AND CSD OIL FILLER POINTS (EACH NACELLE)
(INBD SIDE NO. 1 AND 2 POD, OUTBD SIDE NO. 3 AND 4 POD)
16. PRESSURE REFUEL/DEFUEL POINTS (UNDERWING—LH/RH)
17. ENGINE START CONNECTION (NUMBER 3 ENGINE ONLY)
18. OVERWING GRAVITY FUEL FILLER POINT (OUTBOARD—LH/RH)
19. FUEL QUANTITY LIQUID SIGHT GAGES (UNDERWING—LH/RH)

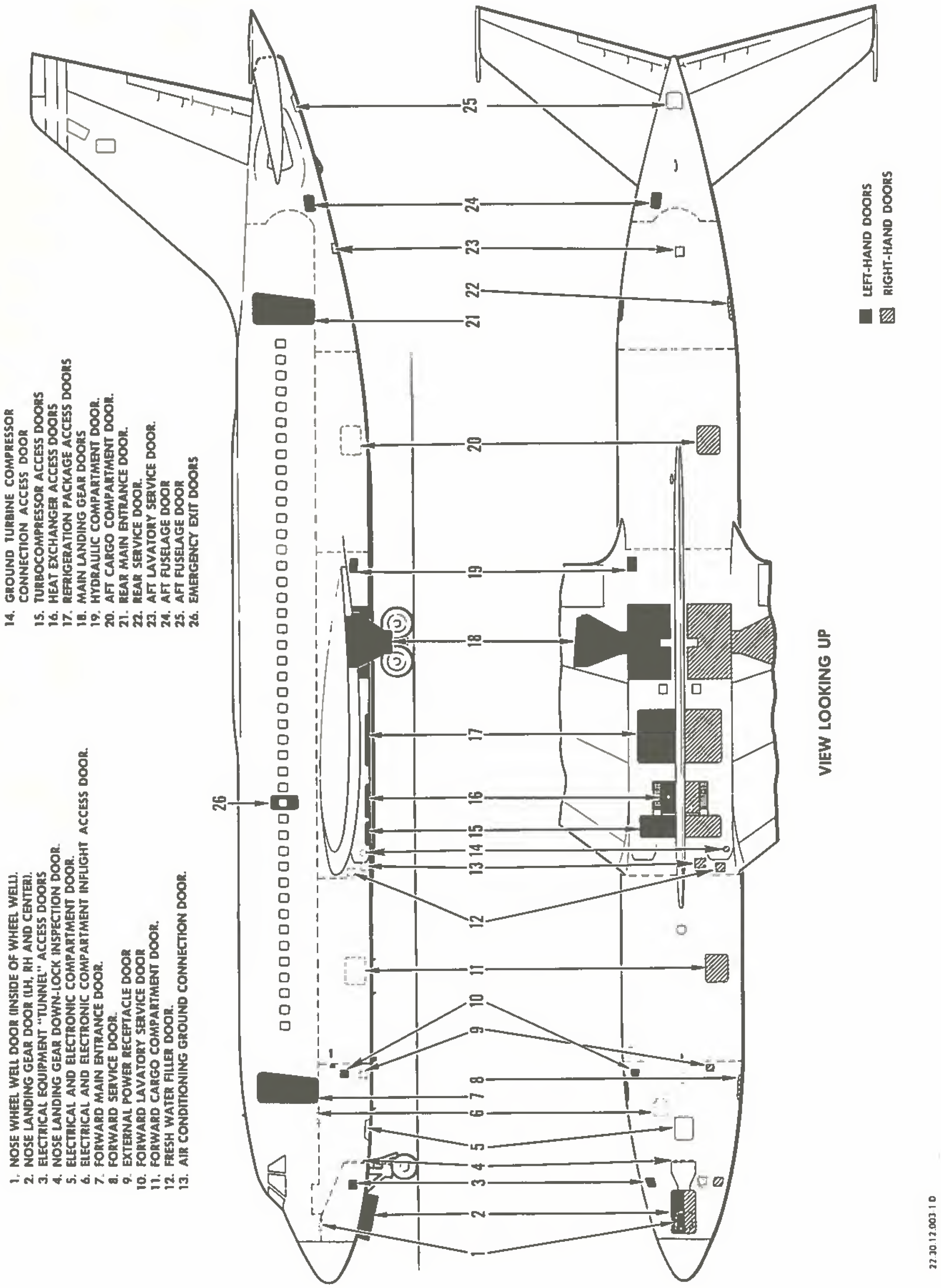


Servicing Points
Figure 1 (Sheet 2 of 3)

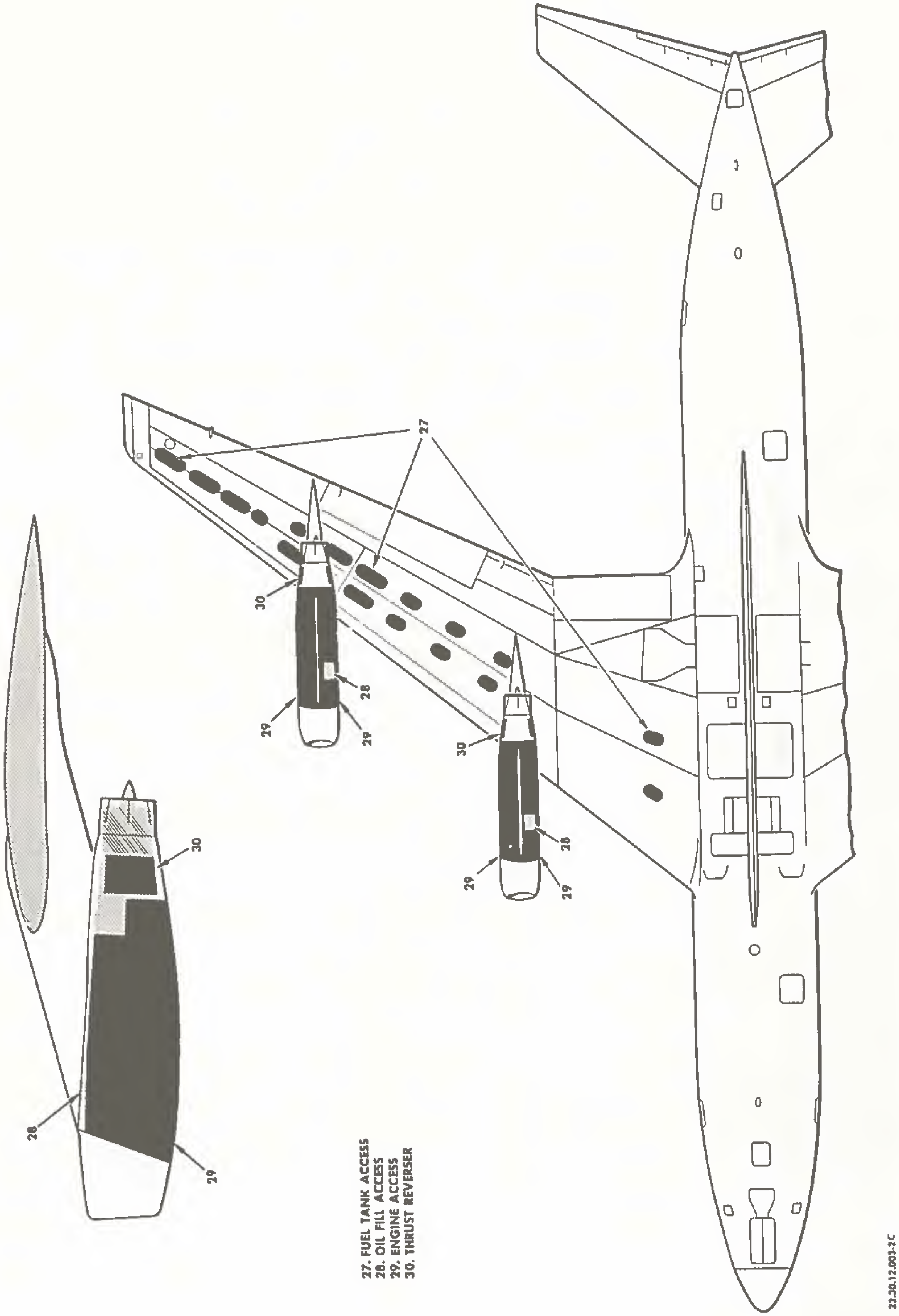


SERVICE INTERPHONE POINTS

Servicing Points
Figure 1 (Sheet 3 of 3)



Airplane Access Doors
Figure 2 (Sheet 1 of 2)



Airplane Access Doors
Figure 2 (Sheet 2 of 2)

TABLE I - FUEL TANK DATA

	U.S. Gallons	Imp. Gallons	Liters
Total quantity......................	10,776	8,973.2	40,790.7
Total usable fuel...................	10,684	8,896.5	40,442.4
Total quantity - each outboard tank...	2,388	1,988.49	9,039.37
Total quantity - each inboard tank....	3,000	2,498.1	11,356.00

	Pounds JP-4	Pounds Kerosene
Total weight........................	70,044	72,199
Total usable fuel...................	69,446	71,582

NOTE: Total weight and total usable fuel based on 6.5 pounds per gallon of JP-4 and 6.7 pounds per gallon of kerosene.

CAUTION: SPECIFIC GRAVITY (FUEL WEIGHT) VARIES WITH TEMPERATURE. IN DETERMINING FUEL LOAD EXPANSION SPACE MUST BE ALLOWED FOR POSSIBLE INCREASE IN AMBIENT TEMPERATURE WHILE THE AIRPLANE IS GROUNDBORNE.

1. Refueling-Defueling (see Figures 201 and 202)

A. General Rules and Safety Precautions.

The following general rules and safety precautions must always be observed during fueling operations:

(1) Locate the airplane in a non-congested area with a minimum distance of 50 feet between other aircraft or structures, and a minimum of 100 feet from hangars.

(2) Clear the fueling area of all unnecessary work stands and other equipment which may damage the airplane as it settles due to the weight of the fuel.

(3) If used, wheel chocks should be nonmetallic, and shall be placed approximately two inches from the wheels to allow for expansion of the tires due to increased gross weight when fuel is taken aboard.

(4) Prohibit open flames, sparks or smoking within 50 feet of the airplane (allowing for wind conditions) during fueling operations.

(5) Locate source of external electrical power a minimum of 50 feet from the airplane.

(6) Prohibit the operation of reciprocal, jet or other combustion type engines within 150 feet of fueling operations.

WARNING: OPERATION OF RADAR OR RADIO TRANSMITTING EQUIPMENT OF THE AIRPLANE, OR WITHIN A RADIUS OF 300 FEET OF THE AIRPLANE, MUST BE PROHIBITED.

(7) Locate fire truck and attendants near the airplane, in a standby condition.

(8) Position the fuel truck in a manner to permit rapid removal from the fueling area in the event of fire.

NOTE: Fuel truck operator(s) shall not leave the truck during fueling operations and/or as long as the truck is connected to the airplane.

(9) Fuel hoses must be maintained in good condition, free from breaks or worn spots.

(10) Open all electrical circuits on the airplane, except those necessary for fueling operations.

(11) Allow only authorized personnel (those absolutely necessary for fueling operations) in the fueling area.

(12) All servicing personnel within the "vapor area" (50 foot radius of fueling point with allowance for wind condition) must carry only safety type tools and nonmetallic personal items.

WARNING: SHOES WITH EXPOSED NAILS, CAPS OR CLEATS SHALL NOT BE WORN IN THE FUELING AREA.

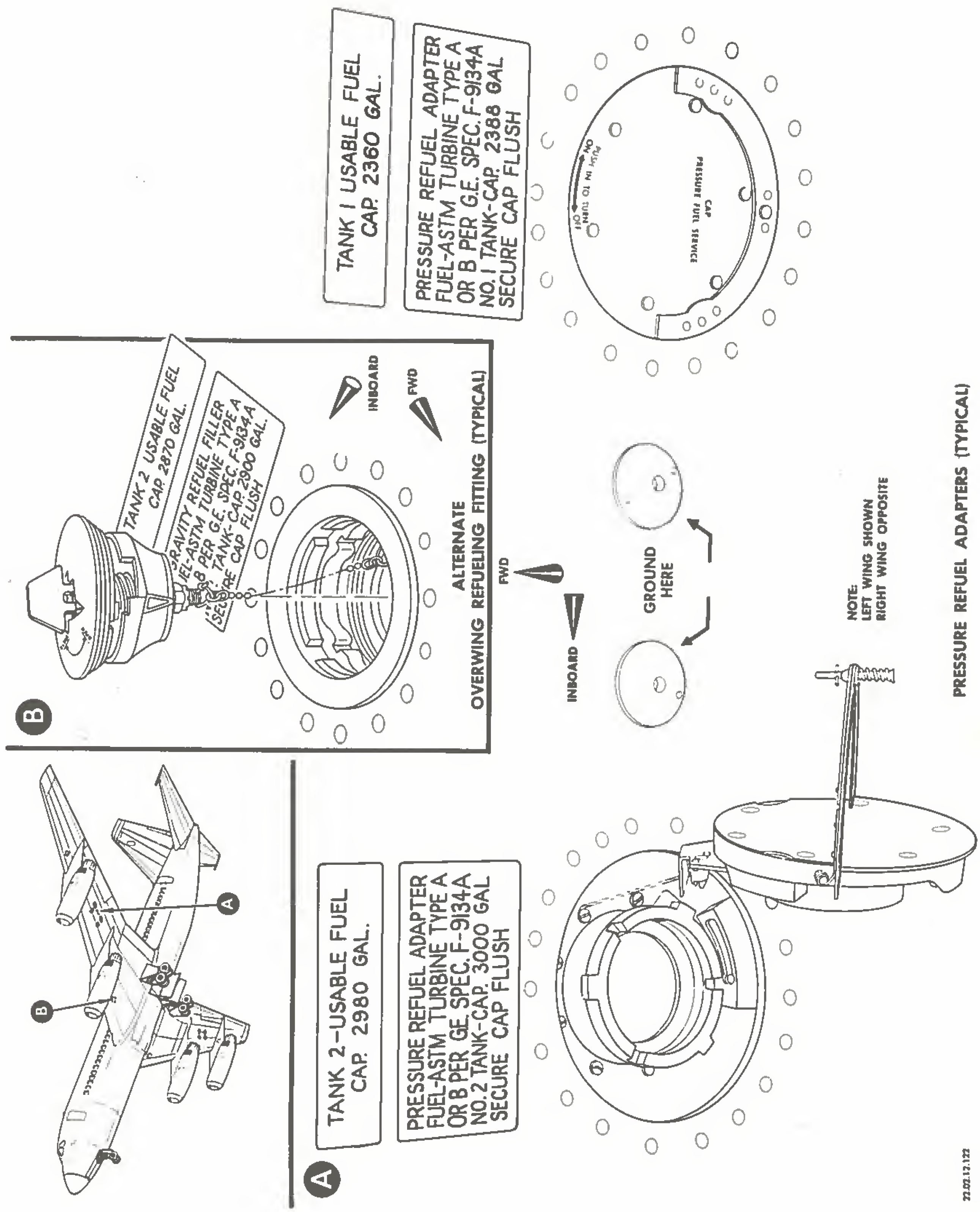
(13) Fuel nozzles shall not be "blocked" in an open position; nozzles must be manually operated at all times.

NOTE: The pressure refuel-defuel nozzles will not open the check valve in the refuel-defuel adapters unless properly inserted and locked in the adapter.

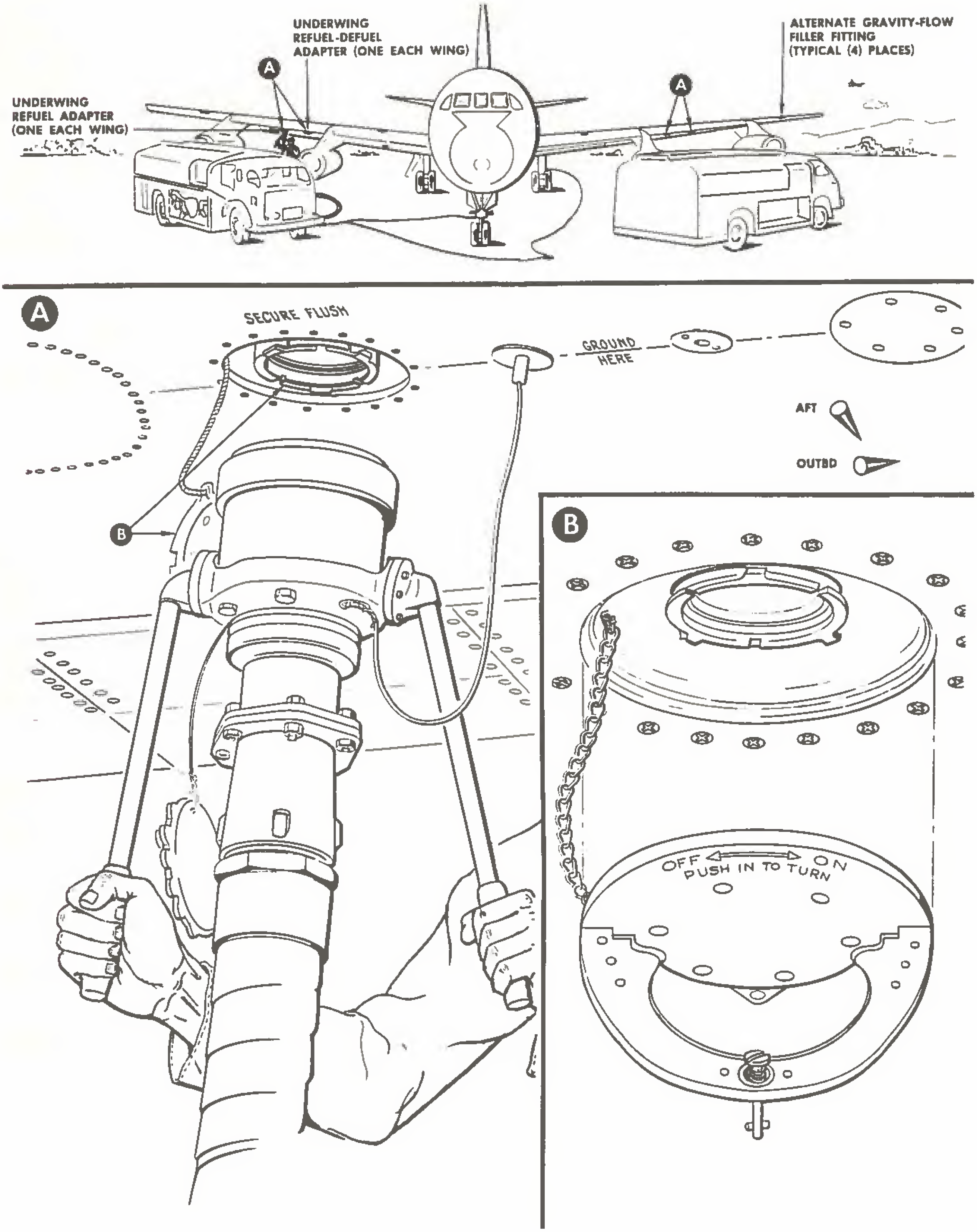
(14) Station one man at the wheel cart CO_2 bottle to operate the control valve, and another man to handle the nozzle.

NOTE: During alternate (emergency) overwing fueling, the man handling the nozzle should be positioned on a suitable stand elevated to the approximate height of the wing.

(15) Wipe up any spilled fuel immediately and flush area thoroughly with water.



Pressure and Gravity Flow Fueling Adapters
Figure 201



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Connecting Refuel - Defuel Adapters
Figure 202

2. Pressure Refueling

A. Equipment Required.

(1) Fuel truck equipped as follows:

(a) Fuel hose with nozzle conforming to Specification MIL-M-5877 (Type D-1).

(b) Integral static ground wire (2).

(2) Fuel tank drain valve operating tool (Accessories Product Co. No. 704400).

(3) Source of external ac electrical power with approved power cable 50 feet (minimum) in length.

(4) Static ground wires (2) (AWG No. 8 cable or larger) with battery clips brazed to both ends.

(5) Ohmmeter.

(6) Two four-to-five pound CO_2 fire extinguishers and one fifty pound wheel cart CO_2 bottle (or equivalent).

(7) Miscellaneous spark-proof tools as required.

(8) Explosion-proof lighting and flashlights for fueling operations performed at night.

(9) Interphone communication equipment (refer to Chapter 23, COMMUNICATIONS).

B. Fueling Procedure.

CAUTION: THE AIRPLANE MAY BE REFUELED BY ANY FUELING SEQUENCE THAT ALLOWS AN INBOARD TANK TO BE FUELED EITHER PRIOR TO OR CONCURRENTLY WITH AN OUTBOARD TANK. FUELING IN THIS MANNER WILL ELIMINATE THE POSSIBILITY OF A TAIL TIP DOWN CONDITION CAUSED BY FUELING OUTBOARD TANKS PRIOR TO IN-BOARD TANKS.

NOTE: The engines may be operated on commercial jet fuel, JP-4 or JP-5 (per GE Specification M50T968). The engines should operate satisfactorily with either of these fuels or a mixture thereof; no fuel control adjustment is required for these different fuels. Fuel supplied to the aircraft tanks should be passed through a 10-micron filter.

(1) Ascertain that the lateral and longitudinal axes of the airplane are approximately level (zero degree nose up attitude).

NOTE: Observe general rules and safety procedures as outlined in paragraph 1.A.

(2) Ground airplane and fuel truck as follows:

(a) Attach static ground cable from each landing gear to an approved type driven ground rod or other approved ground; make connection at the landing gear FIRST--at the ground point LAST.

CAUTION: ATTACH STATIC GROUND CABLE CLAMP TO GROUND FITTING ON LANDING GEAR TORQUE ARMS. ATTACHING CLAMP TO OTHER SURFACES ON GEAR WILL CAUSE SCRATCHES AND GOUGES ON HIGH-STRENGTH STEEL PARTS.

(b) Attach static ground cable from fuel truck to the same ground as one of the static cables from main landing gear.

(c) Attach static ground cable from fuel truck to ground fitting on nose landing gear torque arm.

NOTE: After all ground connections are complete, check each connection with ohmmeter; resistance shall not exceed 10 ohms at any point.

(3) Drain water and/or sediment from fuel tank drain valves using operating tool (Accessories Product Co. No. 704400).

(4) Connect source of external electrical power to airplane (refer to Chapter 24, ELECTRICAL POWER).

WARNING: PRIOR TO HANDLING FUEL HOSES OR REMOVING REFUEL-DEFUEL ADAPTER CAPS, SERVICING PERSONNEL MUST DISCHARGE STATIC ELECTRICITY FROM THEIR BODIES BY CONTACTING ONE OF THE GROUND CONNECTIONS WITH HANDS.

(5) Insert the static discharge jumper from the fuel nozzle(s) into the grounding receptacles adjacent to the refuel-defuel adapters. The grounding receptacles are identified by the words "GROUND HERE".

(6) Insert and lock fuel nozzle in pressure refuel-defuel adapters.

CONVAIR 880

MAINTENANCE MANUAL

TEMPORARY REVISION NO. 12-41.

Insert facing 12-1-0, Page 206, dated July 9/62.

The instructions on the noted facing page are to be used for all applicable airplanes except as follows: for airplanes not modified per Service Bulletin No. 32-14, substitute the following instructions where indicated.

Retain this temporary revision in your manual until all applicable airplanes have been modified per noted Service Bulletin.

Delete CAUTION following step (2)(a) and replace with the following:

> CAUTION: ATTACH STATIC GROUND CABLE CLAMP TO TOWING LUGS ON MAIN LANDING GEAR. ATTACHING CLAMP TO OTHER SURFACES ON GEAR WILL CAUSE SCRATCHES AND GOUGES ON HIGH STRENGTH STEEL PARTS.

Delete step (2)(c) and replace with the following:

(c) Attach static ground cable from fuel truck to an approved ground connection on nose landing gear.

TEMPORARY REVISION NO. 12-55.

Insert facing 12-1-0, Page 206, dated July 9/62

The instructions on the noted facing page are to be used for all applicable airplanes except as follows: for airplanes not modified per Service Bulletin No. 32-14, substitute the following instructions where indicated.

Retain this Temporary Revision in your manual until all applicable airplanes have been modified per noted Service Bulletin.

Delete CAUTION following step (2) (a) and replace with the following:

> CAUTION: ATTACH STATIC GROUND CABLE CLAMP TO TOWING LUGS ON MAIN LANDING GEAR. ATTACHING CLAMP TO OTHER SURFACES ON GEAR WILL CAUSE SCRATCHES AND GOUGES ON HIGH STRENGTH STEEL PARTS.

Delete step (2) (c) and replace with the following:

(c) Attach static ground cable from fuel truck to an approved ground connection on nose landing gear.

WARNING: DO NOT REFUEL TANKS IF WIRING TO A FUEL QUANTITY INDICATOR OR TO THE TRANSFER SWITCH BOX IS DISCONNECTED. WHEN WIRING IS DISCONNECTED THE GROUND CONNECTION FOR THE ASSOCIATED TANK PROBES IS OPEN AND STATIC ELECTRICITY MAY BUILD UP DURING REFUELING. (DURING SYSTEM FUNCTIONAL TESTING INDICATORS NEED NOT BE INSTALLED, BUT MUST BE CONNECTED ELECTRICALLY.

(7) Close REFUEL VALVE SHUTOFF SOL, LH and RH, REFUEL CONT and FUEL QTY IND TANK NO. 1, 2, 4, and TANK NO. 3 & TOTAL circuit breakers on main circuit breaker panel.

(8) Precheck shutoff controls on right and left inboard pylon refuel control panels as follows (see Figure 203):

(a) Set PRE-SET-REFUEL CONTROLS TANK NO. 1, 2, 3, and/or 4 (depending on tank or tanks to be filled) for quantity less than, but within 500 pounds of, fuel quantity in corresponding tank.

CAUTION: FUEL WILL FLOW INTO TANK IF PRE-SET-REFUEL CONTROL IS NOT SET WITHIN 500 POUNDS LESS THAN FUEL QUANTITY IN TANK.

(b) Start pump on fuel truck and establish fuel flow of 200 to 300 gpm at a pressure of 50 (±5.0) psig; there shall be no fuel flow.

NOTE: Fuel flow may occur momentarily until the shutoff control lines in the wing tank fill.

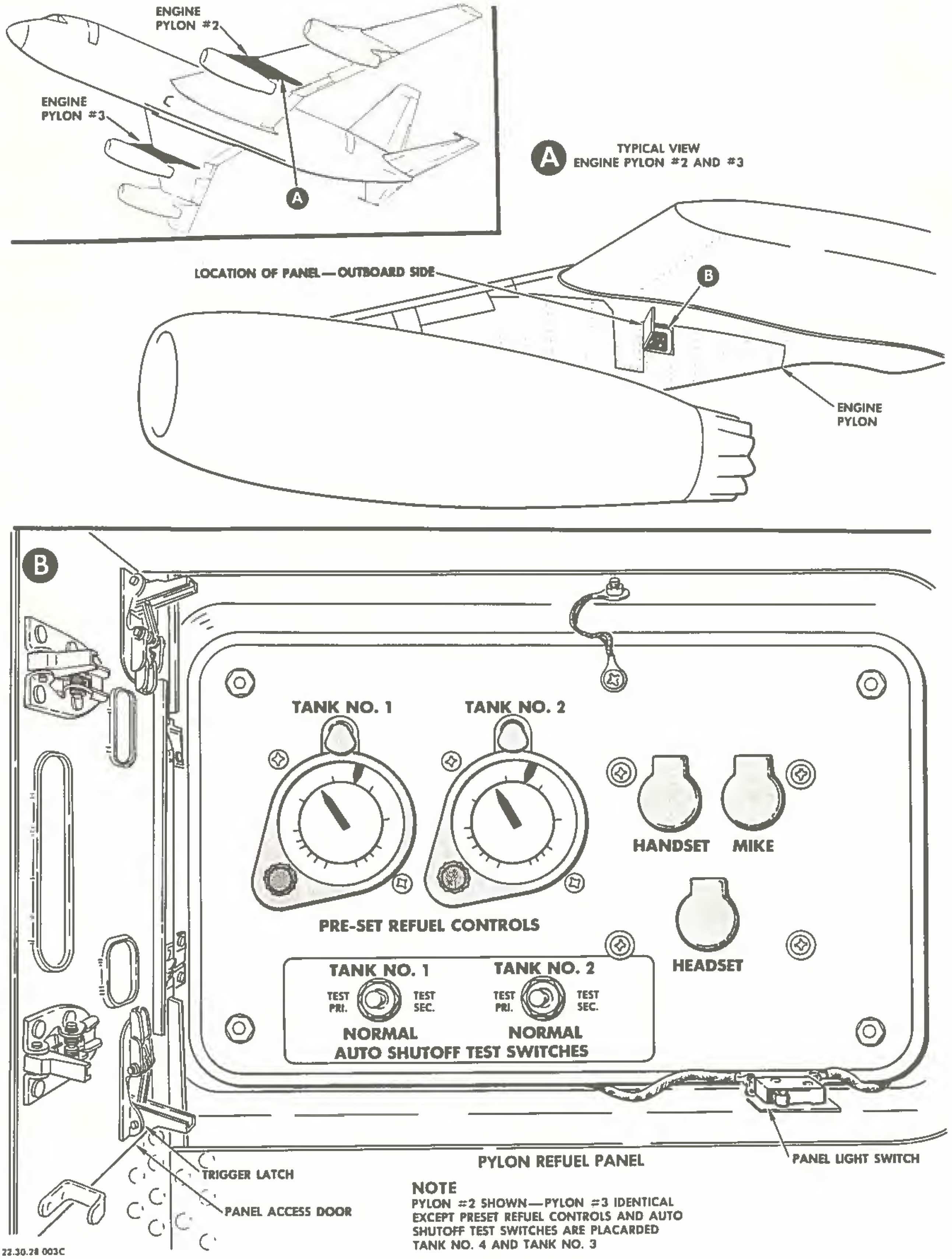
(c) Set PRE-SET REFUEL CONTROLS corresponding to tank(s) to be fueled to desired quantity; fuel flow shall start.

(d) Place corresponding AUTO SHUT OFF TEST SWITCH in TEST PRI position; fuel flow shall stop within 10 seconds, maximum.

NOTE: When fuel flow is stopped automatically, or when the AUTO SHUT OFF TEST SWITCH is placed in the TEST PRI or TEST SEC positions, fuel flow stoppage can be noted by a pressure surge effect on the fuel hose, by the fuel meter on the tank truck hydrant, or on the fuel quantity repeater gage on the pylon fuel control panel.

(e) Repeat step (d), except substitute TEST SEC for TEST PRI.

(9) Release corresponding AUTO SHUTOFF TEST SWITCH to NORMAL position and start fueling; continue fueling until automatic shutoff occurs.



Pylon Refuel Control Panel
Figure 203

CAUTION: DURING FUELING OPERATIONS CHECK FOR AIR FLOWING FROM RAM-VENT SCOOPS. IF AIR DOES NOT FLOW FROM SCOOPS, STOP FUELING PROCEDURE AND INVESTIGATE FOR TROUBLE. FUEL FLOW CAN BE STOPPED BY PLACING AUTO SHUTOFF TEST SWITCH (FOR EACH TANK BEING FUELED) IN EITHER TEST PRI OR TEST SEC POSITION OR BY PLACING PRESET REFUEL CONTROLS PRESET POINTER (FOR EACH TANK BEING FUELED) TO LESS THAN QUANTITY LEVEL IN TANK.

WARNING: IN STEP (10) FOLLOWING, REMOVE FUEL NOZZLE(S) AND CLOSE REFUEL-DEFUEL ADAPTER CAPS BEFORE REMOVING STATIC DISCHARGE JUMPERS FROM GROUNDING RECEPTACLES.

(10) When fueling is complete, shut off fuel pump on tank truck, reduce fuel pressure to 0 psig and disconnect fuel nozzle(s) from refuel-defuel adapter(s); remove static discharge jumpers from wing grounding receptacles.

WARNING: IF FUEL IS SPILLED, IMMEDIATELY WIPE UP AND FLUSH AREA WITH WATER.

(11) Open circuit breakers closed in step (7).

(12) Remove external source of electrical power from airplane.

(13) Remove all grounding equipment in reverse order of installation; refer to step (2).

C. Defueling Procedure.

(1) Observe general rules and safety measures as outlined in paragraph 1.A.

WARNING: DO NOT DEFUEL TANKS IF WIRING TO A FUEL QUANTITY INDICATOR OR TO THE TRANSFER SWITCH BOX IS DISCONNECTED. WHEN WIRING IS DISCONNECTED THE GROUND CONNECTION FOR THE ASSOCIATED TANK PROBES IS OPEN AND STATIC ELECTRICITY MAY BUILD UP DURING DEFUELING. DURING SYSTEM FUNCTIONAL TESTING INDICATORS NEED NOT BE INSTALLED, BUT MUST BE CONNECTED ELECTRICALLY.

(2) Ground airplane and fuel truck as outlined in step 2.B.(2).

(3) Connect source of external electrical power to airplane (refer to Chapter 24, ELECTRICAL POWER).

WARNING: PRIOR TO HANDLING FUEL HOSES AND/OR REMOVING REFUEL-DEFUEL ADAPTER CAPS, SERVICING PERSONNEL MUST DISCHARGE STATIC ELECTRICITY FROM THEIR BODIES BY CONTACTING ONE OF THE GROUND CONNECTIONS WITH HANDS.

(4) Insert static discharge jumper, attached to fuel nozzle, into grounding receptacle adjacent to refuel-defuel adapters; the grounding receptacles are marked GROUND HERE.

NOTE: In step (5) following, connect fuel nozzle(s) to the inboard (No. 2 and/or No. 3) fuel tank adapters only.

(5) Insert and lock fuel nozzle(s) in refuel-defuel adapter(s).

(6) Connect interphone communication equipment (refer to Chapter 23, COMMUNICATIONS).

(7) Close the following circuit breakers on main circuit breaker panel:

(a) DEFUEL VALVE, LH and/or RH.

(b) FUEL LINE VALVE, TANK NO. 1, NO. 2, NO. 3 or NO. 4 as required.

(c) FUEL CROSSFEED VALVE, TANK NO. 1, NO. 2, NO. 3 or NO. 4 as required.

(d) FUEL EMER CROSSFEED VALVE.

(e) REFUEL CONT (optional).

(f) FUEL QTY IND TANK NO. 1, 2, 4 and TANK NO. 3 & TOTAL (optional).

(8) Place left or right wing DEFUEL VALVE switch (guarded switch on flight engineer's fuel control panel) in OPEN position; VALVE-INTRANSIT (blue) light on control panel shall illuminate and then extinguish, and VALVE OPEN (red) light shall illuminate (see Figure 204).

NOTE: If two fuel trucks are being used to defuel the airplane, open both defuel valves.

(9) Open or close the following valves (on flight engineer's fuel control panel) to place tank system in correct configuration to defuel desired tank or tanks:

(a) TANK NO. 1, 2, 3 and 4 LINE VALVE.

(b) TANK NO. 1, 2, 3 and 4 CROSSFEED VALVE.

(c) EMER CROSSFEED VALVE (right and left valves operated by one switch).

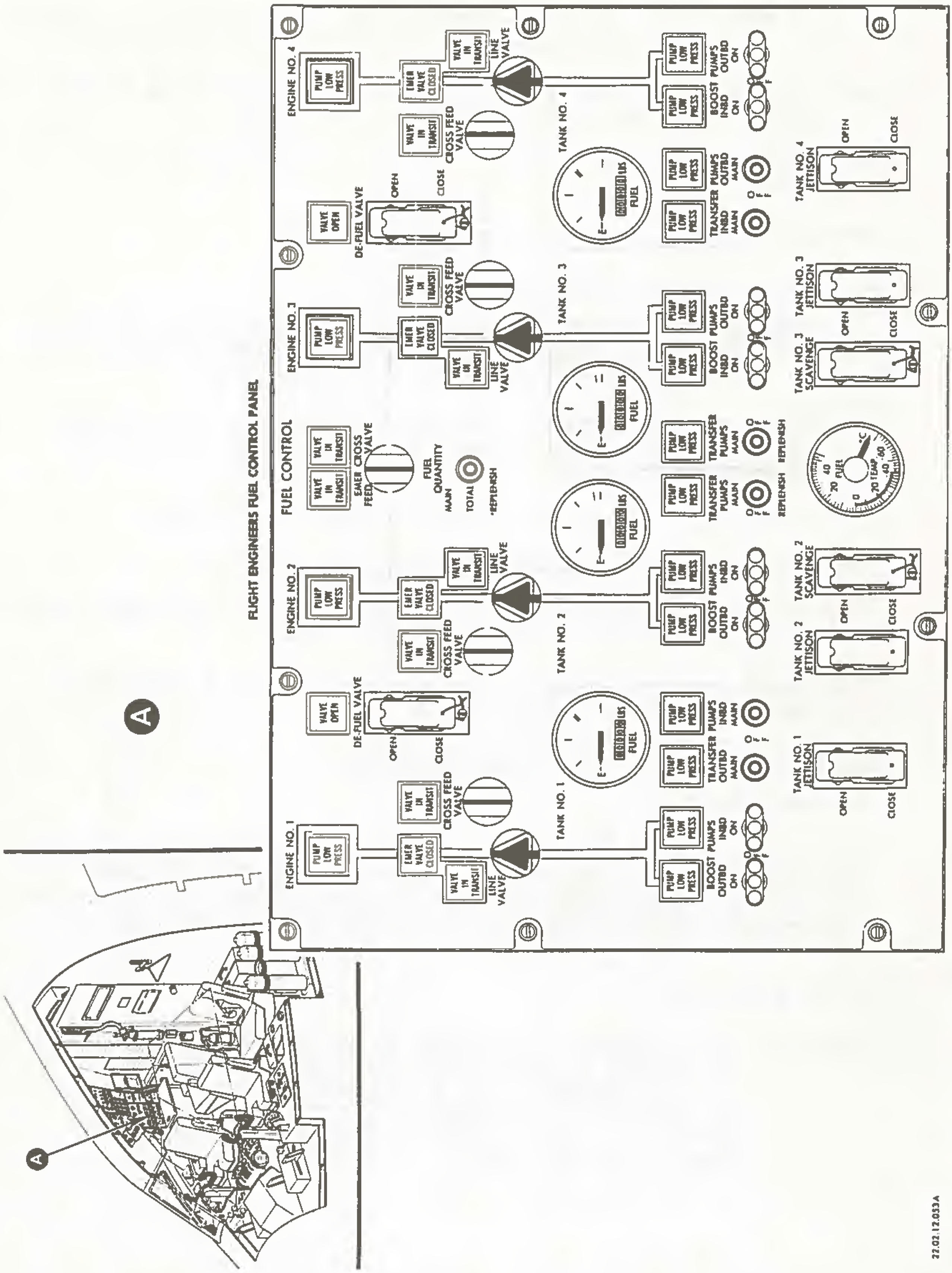
NOTE: If it is desired to defuel the two outboard fuel tanks (tanks No. 1 and No. 4), using one refuel-defuel adapter only, proceed as follows:

(d) Open tank No. 1 and No. 4 LINE VALVE.

(e) Open tank No. 1 and No. 4 CROSSFEED VALVE.

(f) Open EMER CROSSFEED VALVE (2).

(g) Close tank No. 2 and No. 3 CROSSFEED VALVE.



Flight Engineer's Fuel Control Panel
Figure 204

NOTE: Defueling configurations can be followed on the schematic printed on the flight engineer's fuel control panel.

(10) Start fuel truck suction pump and establish fuel flow of 50 gpm; airplane will defuel at a minimum rate of 50 gpm.

(11) Notify ground crew when fuel tanks are empty; stop fuel truck suction pump.

(12) Place all airplane valves in CLOSED position.

(13) Open circuit breakers closed in step (7).

WARNING: IN STEP (14) FOLLOWING, REMOVE FUEL NOZZLE(S) AND CLOSE REFUEL-DEFUEL ADAPTER CAP(S) BEFORE REMOVING STATIC DISCHARGE JUMPER FROM WING GROUND RECEPTACLE.

(14) Disconnect fuel nozzle(s) from defuel adapter(s); secure refuel-defuel adapter cap(s) and remove static discharge jumpers from ground receptacles.

(15) Remove source of external electrical power from airplane.

(16) Remove interphone communication equipment.

(17) Drain remaining fuel from fuel tank drain valves using valve operating tool, Accessories Products Co. No. 704400.

(18) Remove grounding equipment from airplane in reverse order of installation; refer to step 2.B.(2).

3. Refueling-Alternate (Emergency) Overwing Method

A. Equipment Required.

The equipment required for alternate (emergency) overwing refueling is the same as required for pressure refuel-defuel (underwing) procedures with the exception of the fuel truck hose and nozzle. The fuel truck must be equipped with a standard hose incorporating a two-inch fuel nozzle with integral ground wires.

B. Fueling Procedure.

CAUTION: THE AIRPLANE MAY BE REFUELED BY ANY FUELING SEQUENCE THAT ALLOWS AN INBOARD TANK TO BE FUELED EITHER PRIOR TO OR CONCURRENTLY WITH AN OUTBOARD TANK. FUELING IN THIS MANNER WILL ELIMINATE THE POSSIBILITY OF A TAIL TIP DOWN CONDITION CAUSED BY FUELING OUTBOARD TANKS PRIOR TO INBOARD TANKS.

NOTE: During normal (pressure) refueling the inboard main tanks are full before fuel enters the inboard replenish tanks; however, when the airplane is gravity (overwing) refueled, fuel enters the replenish tanks and flows by gravity to the main tanks thereby filling the inboard main and replenish tanks simultaneously and approximately equally. Under these conditions, it may be necessary to transfer part of the fuel out of the inboard replenish tank to completely fill the inboard main tank. The inboard replenish tank may then be filled to capacity.

The engines may be operated on commercial jet fuel, JP-4 or JP-5 (per GE Specification M50T968). The engines should operate satisfactorily with either of these fuels or a mixture thereof; no fuel control adjustment is required for these different fuels. Fuel supplied to the aircraft tanks should be passed through a 10-micron filter.

(1) Observe general rules and safety measures as outlined in paragraph 1.A.

(2) Ground airplane and fuel truck as outlined in Step 2.B.(2).

(3) Connect source of external electrical power to airplane (refer to Chapter 24, ELECTRICAL POWER).

(4) Connect interphone communication equipment (refer to Chapter 23, COMMUNICATIONS).

(5) Insert static discharge jumper, attached to fuel nozzle, into grounding receptacle adjacent to fuel filler receptacle; grounding receptacle is marked "GROUND HERE."

(6) Remove fuel filler receptacle cap and insert fuel nozzle into receptacle.

(7) Close FUEL QTY IND TANK NO. 1, 2, 4 and TANK NO. 3 & TOTAL circuit breakers on main circuit breaker panel.

(8) Start fuel truck pump and establish fuel flow of 200 gpm; refuel tanks as required.

NOTE: If partial refueling is to be accomplished, station servicing personnel at flight engineer's or pylon fuel control panel to read quantity gages.

CAUTION: USE EXTREME CARE TO AVOID SPILLING OR OVERFLOWING FUEL WHEN "TOPPING OFF" TANKS.

(9) When refueling is complete, shut off fuel pump on tank truck and reduce fuel pressure to 0 psig.

<u>WARNING:</u> IN STEP (10) FOLLOWING, MAKE SURE THAT FUEL FILLER RECEPTACLE CAP IS PROPERLY INSTALLED BEFORE REMOVING STATIC DISCHARGE JUMPER FROM GROUNDING RECEPTACLE.

(10) Remove fuel nozzle, close and secure fuel filler receptacle cap and remove static discharge jumper from grounding receptacle.

(11) Open circuit breakers closed in step (7).

(12) Remove external source of electrical power from airplane.

(13) Remove interphone communication equipment.

(14) Remove grounding equipment from airplane in reverse order of installation; refer to step 2.B.(2).

4. Fuel Distribution After Refueling

A. General.

Tables I and II show fuel distribution in the outboard and inboard tanks respectively. The tables are to be used only after refueling. Due to fuel sequencing, the tables are not correct after fuel has been supplied to the engines or after the tanks have been partially defueled.

TABLE I

OUTBOARD TANKS (TANK NO. 1 OR NO. 4)

TOTAL IN MAIN AND REPLENISH TANKS	TOTAL IN MAIN TANK	TOTAL IN REPLENISH TANK
1600	1600	0
1637	1637	0
1700	1650	50
1800	1720	80
1900	1750	150
2000	1770	230
2100	1783	317
2200	1783	417
2300	1783	517
2390	1783	607

TABLE II

INBOARD TANKS (TANK NO. 2 OR NO. 3)

TOTAL IN MAIN AND REPLENISH TANKS	TOTAL IN MAIN TANK	TOTAL IN REPLENISH TANK
1500	1500	0
1583	1583	0
1600	1590	10
1700	1590	110
1800	1590	210
1900	1590	310
2000	1590	410
2100	1590	510
2200	1590	610
2300	1590	710
2400	1590	810
2500	1590	910
2600	1590	1010
2700	1590	1110
2800	1590	1210
2900	1590	1310
2957	1590	1367

5. Fuel Tank Liquid Sight Gage (Drip Stick) Measurement Tables (see Figures 205 through 212)

A. General.

To use the drip stick measurement tables the airplane must be level laterally (wings level) or longitudinally (fuselage level) and the degree of angle for the direction opposite the level attitude must be determined. For example, if the airplane is level longitudinally (fuselage level), then the degree of angle laterally (wing high or wing low) must be determined. The airplane angular inclination may be determined by the use of a spirit level applied to the leveling lugs installed in the left main wheel well. Deviation from level may be determined by raising the low end of the spirit level to obtain a level reading and then measuring the distance from the lug upper edge to the level lower surface.

The following table may be used to convert linear dimensions to degrees, and is based on 19.1 inches between longitudinal and 16.15 inches between lateral lugs.

	Longitudinal Lugs	Lateral Lugs
2.0 degrees	0.665 inch	0.58 inch
1.5 degrees	0.50 inch	0.435 inch
1.0 degree	0.335 inch	0.29 inch
0.5 degree	0.165 inch	0.145 inch

Refer to Chapter 8, LEVELING AND WEIGHING, for airplane leveling methods. Refer to Chapter 28, FUEL, for description and operation of the drip sticks.

6. Fuel Tank Corrosion Inhibitor Servicing (Applicable only to airplanes with corrosion inhibitor containers installed.)

A. General.

Corrosion inhibitor containers, each containing a bag of potassium dichromate crystals, are installed in the fuel tanks. These containers are installed adjacent to the opened end of each low point drain tube. Potassium dichromate crystals in container bags should be replenished periodically and when fuel tanks are opened for maintenance.

B. Equipment Required - Potassium dichromate crystals (size of pea gravel or larger).

C. Service Corrosion Inhibitor Containers.

(1) Remove inhibitor container cover attaching bolts(2).

(2) Remove cover; remove Dacron bag from container and replenish potassium dichromate crystals in bag.

(3) Replace bag and install container cover.

FUEL TANK DRIP STICK MEASUREMENT TABLES
AIRPLANE LEVEL LATERALLY (LEFT AND RIGHT)

INBOARD DRIP STICK MEASUREMENTS (MAIN TANK)

NOSE UP (DRIP STICK READINGS)					GALLONS	NOSE DOWN (DRIP STICK READINGS)				
2°	1.5°	1°	0.5°	0°		0°	0.5°	1°	1.5°	2°
NS	NS	NS	NS	0.2	300	0.2	0.3	0.3	0.4	0.4
1.2	1.5	1.7	1.7	1.9	400	1.9	2.0	2.1	2.1	2.1
2.6	2.9	3.1	3.1	3.3	500	3.3	3.4	3.6	3.6	3.7
3.7	3.9	4.2	4.3	4.6	600	4.6	4.8	5.0	5.1	5.2
4.7	4.9	5.3	5.5	5.8	700	5.8	6.0	6.3	6.4	6.7
5.8	6.2	6.5	6.8	7.0	800	7.0	7.3	7.6	7.8	8.1
7.0	7.4	7.6	7.9	8.1	900	8.1	8.4	8.7	9.0	9.3
7.8	8.1	8.4	8.8	9.1	1000	9.1	9.4	9.7	10.1	10.4
8.5	8.8	9.7	9.5	10.0	1100	10.0	10.3	10.7	11.1	11.5
9.3	9.7	10.1	10.5	10.9	1200	10.9	11.2	11.7	12.2	12.7
10.3	10.8	11.1	11.5	11.9	1300	11.9	12.3	12.9	13.7	NS
11.5	11.8	12.3	12.6	13.1	1400	13.1	13.8	NS	NS	NS
12.1	12.4	12.9	13.4	13.8	1450	13.8	NS	NS	NS	NS
12.8	13.1	13.6	NS	NS	1500	NS	NS	NS	NS	NS

OUTBOARD DRIP STICK MEASUREMENTS (MAIN TANK)

NOSE UP (DRIP STICK READINGS)					GALLONS	NOSE DOWN (DRIP STICK READINGS)				
2°	1.5°	1°	0.5°	0°		0°	0.5°	1°	1.5°	2°
3.0	2.1	1.2	0.4	NS	1200	NS	NS	NS	NS	NS
3.9	3.0	2.2	1.4	0.6	1300	0.6	NS	NS	NS	NS
4.7	3.9	3.1	2.3	1.6	1400	1.6	0.9	0.2	NS	NS
5.4	4.6	3.9	3.1	2.7	1500	2.7	2.0	1.5	1.0	0.5
6.5	5.7	5.2	3.9	4.0	1600	4.0	3.6	3.1	2.8	2.4
8.7	8.1	7.5	5.2	6.4	1700	6.4	6.2	5.9	5.6	5.6
NS	NS	NS	9.6	9.6	1775	9.6	9.1	9.0	8.8	8.7

REPLENISHING TANK

NOSE UP (DRIP STICK READINGS)					GALLONS	NOSE DOWN (DRIP STICK READINGS)				
2°	1.5°	1°	0.5°	0°		0°	0.5°	1°	1.5°	2°
3.1	3.3	3.4	3.6	3.6	100	3.6	3.8	3.9	4.0	4.1
6.1	6.5	6.7	6.9	7.0	200	7.0	7.0	7.3	7.4	7.4
7.7	8.0	8.5	8.6	NS	300	NS	NS	NS	NS	NS
9.1	NS	NS	NS	NS	400	NS	NS	NS	NS	NS

NOTES: 1. NS INDICATES NON-STICKABLE.
2. DRIP STICK READINGS IN INCHES.
3. FIGURES INSIDE HEAVY LINE INDICATE RECOMMENDED DRIP STICK READING RANGE.

.22.02.12.100

Main and Replenishing Tanks No. 1 or 4 Drip Stick Measurement Tables (Wing Level)
Figure 205

FUEL TANK DRIP STICK MEASUREMENT TABLES
AIRPLANE LEVEL LATERALLY (LEFT AND RIGHT)

MAIN TANK NO. 2 OR 3

NOSE UP (DRIP STICK READINGS)						NOSE DOWN (DRIP STICK READINGS)				
2°	1.5°	1°	0.5°	0°	GALLONS	0°	0.5°	1°	1.5°	2°
NS	NS	NS	NS	NS	800	NS	NS	NS	NS	NS
NS	NS	NS	NS	NS	900	NS	NS	NS	NS	NS
1.7	1.7	1.5	1.2	1.2	1000	1.2	0.9	0.9	0.9	0.7
3.5	3.5	3.5	3.3	3.3	1100	3.3	3.1	3.0	2.9	2.9
5.6	5.6	5.5	5.3	5.3	1200	5.3	5.1	5.1	4.9	4.9
7.8	7.7	7.7	7.5	7.5	1300	7.5	7.3	7.1	7.1	7.1
10.2	10.1	10.0	10.0	9.9	1400	9.9	9.7	9.7	9.7	9.7
13.1	13.1	12.8	13.0	13.1	1500	13.1	13.1	13.1	13.1	13.1
15.5	15.3	15.3	15.3	15.3	1550	15.3	15.5	15.5	16.0	16.1

REPLENISHING TANK NO. 2 OR 3

NOSE UP (DRIP STICK READINGS)						NOSE DOWN (DRIP STICK READINGS)				
2°	1.5°	1°	0.5°	0°	GALLONS	0°	0.5°	1°	1.5°	2°
1.2	1.2	1.0	1.0	0.5	100	0.5	0.4	0.4	0.3	0.3
5.4	5.4	5.3	5.3	5.1	200	5.1	5.1	5.1	5.1	4.7
8.5	8.5	8.3	8.3	8.3	300	8.3	8.3	8.3	8.3	8.0
10.9	11.0	10.9	11.0	10.9	400	10.9	11.1	11.0	10.9	10.8
13.1	13.3	13.3	13.3	13.3	500	13.3	13.3	13.3	13.3	13.3
15.3	15.5	15.5	15.5	15.5	600	15.5	15.5	15.6	15.6	15.6
17.3	17.5	17.5	17.6	17.6	700	17.6	17.6	17.8	17.8	18.0
19.3	19.4	19.5	19.6	19.7	800	19.7	19.7	19.8	19.8	20.0
21.2	21.2	21.5	21.6	21.7	900	21.7	21.7	21.8	21.8	22.0
23.1	23.2	23.5	23.5	23.7	1000	23.7	23.7	23.8	23.8	24.0
25.0	25.2	25.3	25.4	25.6	1100	25.6	25.6	25.8	25.8	26.0
26.8	27.1	27.1	27.3	NS	1200	NS	NS	NS	NS	NS

NOTES: 1. NS INDICATES NON-STICKABLE.
2. DRIP STICK READINGS IN INCHES.

.22.02.12.099

Main and Replenishing Tanks No. 2 or 3 Drip Stick Measurement Tables (Wing Level)
Figure 206

FUEL TANK DRIP STICK MEASUREMENT TABLES
AIRPLANE FUSELAGE LEVEL FORWARD AND AFT

INBOARD DRIP STICK MEASUREMENTS (MAIN TANK)

LEFT WING HIGH (DRIP STICK READINGS)					GALLONS	LEFT WING LOW (DRIP STICK READINGS)				
2°	1.5°	1°	0.5°	0°		0°	0.5°	1°	1.5°	2°
NS	NS	NS	NS	0.2	300	0.2	0.3	0.5	0.6	0.6
1.3	1.5	1.6	1.9	1.9	400	1.9	2.0	2.0	2.0	2.0
3.0	3.1	3.1	3.3	3.3	500	3.3	3.3	3.2	3.1	3.1
4.6	4.6	4.6	4.6	4.6	600	4.6	4.6	4.3	4.2	4.1
6.0	6.0	6.0	6.0	5.8	700	5.8	5.8	5.6	5.3	5.2
7.4	7.3	7.3	7.3	7.0	800	7.0	6.9	6.7	6.5	6.3
8.9	8.6	8.6	8.5	8.1	900	8.1	8.0	7.6	7.5	7.2
10.2	9.8	9.6	9.4	9.1	1000	9.1	8.8	8.4	8.2	7.8
12.0	10.9	10.7	10.3	10.0	1100	10.0	9.5	9.2	8.8	8.5
13.7	12.2	11.8	11.4	10.9	1200	10.9	10.4	10.0	9.8	9.4
NS	13.6	13.1	12.6	11.9	1300	11.9	11.5	11.1	10.8	10.4
NS	NS	NS	NS	13.1	1400	13.1	12.7	12.2	11.9	11.5
NS	NS	NS	NS	13.8	1450	13.8	13.4	12.9	12.9	12.1
NS	NS	NS	NS	NS	1500	NS	NS	NS	NS	NS

OUTBOARD DRIP STICK MEASUREMENTS (MAIN TANK)

LEFT WING HIGH (DRIP STICK READINGS)					GALLONS	LEFT WING LOW (DRIP STICK READINGS)				
2°	1.5°	1°	0.5°	0°		0°	0.5°	1°	1.5°	2°
NS	NS	NS	NS	NS	1000	NS	NS	NS	0.1	1.1
NS	NS	NS	NS	NS	1100	NS	NS	0.4	1.5	2.5
NS	NS	NS	NS	NS	1200	NS	0.7	1.6	2.7	3.5
NS	NS	NS	NS	0.6	1300	0.6	1.5	2.6	3.5	4.4
NS	NS	0.1	0.7	1.6	1400	1.6	2.4	3.2	4.2	5.1
0.4	1.1	1.4	2.0	2.7	1500	2.7	3.4	3.9	5.0	5.8
2.4	2.9	3.1	3.7	4.0	1600	4.0	4.6	5.3	5.9	6.7
5.5	5.8	6.0	6.3	6.4	1700	6.4	7.0	7.4	7.9	8.5
9.2	9.2	9.3	9.5	9.6	1775	9.6	9.8	9.8	NS	NS

REPLENISHING TANK

LEFT WING HIGH (DRIP STICK READINGS)					GALLONS	LEFT WING LOW (DRIP STICK READINGS)				
2°	1.5°	1°	0.5°	0°		0°	0.5°	1°	1.5°	2°
4.8	4.7	4.3	3.9	3.6	100	3.6	3.4	3.0	2.7	2.2
8.5	8.2	7.9	7.5	7.0	200	7.0	6.6	6.1	5.6	5.0
NS	NS	NS	NS	NS	300	NS	8.5	7.9	7.2	6.5
NS	NS	NS	NS	NS	400	NS	NS	8.9	8.3	7.7

NOTES: 1. NS INDICATES NON-STICKABLE.
2. DRIP STICK READINGS IN INCHES.
3. FIGURES INSIDE HEAVY LINE INDICATE RECOMMENDED DRIP STICK READING RANGE.

.22.02.12.088

Main and Replenishing Tanks No. 1 Drip Stick Measurement Tables (Fuselage Level)
Figure 207

FUEL TANK DRIP STICK MEASUREMENT TABLES
AIRPLANE FUSELAGE LEVEL FORWARD AND AFT

MAIN TANK NO. 2

LEFT WING HIGH (DRIP STICK READINGS)						LEFT WING LOW (DRIP STICK READINGS)				
2°	1.5°	1°	0.5°	0°	GALLONS	0°	0.5°	1°	1.5°	2°
NS	NS	NS	NS	NS	800	NS	NS	NS	NS	0.1
NS	NS	NS	NS	NS	900	NS	0.1	0.7	1.4	1.9
NS	NS	NS	0.5	1.2	1000	1.2	1.9	2.6	3.3	3.8
0.5	1.5	1.8	2.3	3.3	1100	3.3	3.9	4.3	5.3	5.8
2.9	3.4	3.8	4.4	5.3	1200	5.3	6.0	6.4	7.5	7.8
5.3	5.7	6.1	6.7	7.5	1300	7.5	8.1	8.5	9.3	10.7
8.3	8.6	9.0	9.3	9.9	1400	9.9	10.6	10.7	11.3	11.9
11.3	12.3	12.7	12.7	13.1	1500	13.1	13.4	13.4	13.9	14.3
15.5	15.5	15.5	15.3	15.3	1550	15.3	15.3	15.1	15.7	15.7

REPLENISHING TANK NO. 2

LEFT WING HIGH (DRIP STICK READINGS)						LEFT WING LOW (DRIP STICK READINGS)				
2°	1.5°	1°	0.5°	0°	GALLONS	0°	0.5°	1°	1.5°	2°
0.4	0.4	0.5	0.5	0.5	100	0.5	0.6	0.8	0.9	0.9
5.3	5.1	5.4	5.1	5.1	200	5.1	5.1	5.1	5.1	4.9
8.8	8.8	8.6	8.3	8.3	300	8.3	8.1	8.1	8.0	7.5
11.7	11.4	11.4	11.0	10.9	400	10.9	10.7	10.6	10.5	9.9
14.2	13.9	13.9	13.5	13.3	500	13.3	13.0	12.9	12.5	12.1
16.8	16.3	16.2	15.9	15.5	600	15.5	15.2	14.9	14.5	14.1
19.1	18.7	18.4	18.0	17.6	700	17.6	17.3	16.9	16.6	16.1
21.2	20.9	20.5	20.1	19.7	800	19.7	19.3	18.9	18.6	18.1
23.4	23.1	22.4	22.1	21.7	900	21.7	21.2	20.9	20.5	20.0
26.3	24.9	24.3	24.1	23.7	1000	23.7	23.0	22.7	22.5	22.0
27.3	26.7	26.1	26.0	25.6	1100	25.6	25.0	24.7	24.4	23.9
NS	NS	NS	NS	NS	1200	NS	27.3	26.5	26.3	25.7

NOTES: 1. NS INDICATES NON-STICKABLE.
2. DRIP STICK READINGS IN INCHES.

22-02-12-089

Main and Replenishing Tanks No. 2 Drip Stick Measurement Tables (Fuselage Level)
Figure 208

FUEL TANK DRIP STICK MEASUREMENT TABLES
AIRPLANE FUSELAGE LEVEL FORWARD AND AFT

MAIN TANK NO. 3

RIGHT WING LOW (DRIP STICK READINGS)					GALLONS	RIGHT WING HIGH (DRIP STICK READINGS)				
2°	1.5°	1°	0.5°	0°		0°	0.5°	1°	1.5°	2°
0.1	NS	NS	NS	NS	800	NS	NS	NS	NS	NS
1.9	1.4	0.7	0.1	NS	900	NS	NS	NS	NS	NS
3.8	3.3	2.6	1.9	1.2	1000	1.2	0.5	NS	NS	NS
5.8	5.3	4.3	3.9	3.3	1100	3.3	2.3	1.8	1.5	0.5
7.8	7.5	6.4	6.0	5.3	1200	5.3	4.4	3.8	3.4	2.9
10.7	9.3	8.5	8.1	7.5	1300	7.5	6.7	6.1	5.7	5.3
11.9	11.3	10.7	10.6	9.9	1400	9.9	9.3	9.0	8.6	8.3
14.3	13.9	13.4	13.4	13.1	1500	13.1	12.7	12.7	12.3	11.3
15.7	15.7	15.1	15.3	15.3	1550	15.3	15.3	15.5	15.5	15.5

REPLENISHING TANK NO. 3

RIGHT WING LOW (DRIP STICK READINGS)					GALLONS	RIGHT WING HIGH (DRIP STICK READINGS)				
2°	1.5°	1°	0.5°	0°		0°	0.5°	1°	1.5°	2°
0.9	0.9	0.8	0.6	0.5	100	0.5	0.5	0.5	0.4	0.4
4.9	5.1	5.1	5.0	5.1	200	5.1	5.1	5.4	5.1	5.3
7.5	8.0	8.1	8.1	8.3	300	8.3	8.3	8.6	8.8	8.8
9.9	10.5	10.6	10.7	10.9	400	10.9	11.0	11.4	11.4	11.7
12.1	12.5	12.9	13.0	13.3	500	13.3	13.5	13.9	13.9	14.2
14.1	14.5	14.9	15.2	15.5	600	15.5	15.9	16.2	16.3	16.8
16.1	16.6	16.9	17.3	17.6	700	17.6	18.0	18.4	18.7	19.1
18.1	18.6	18.9	19.3	19.7	800	19.7	20.1	20.5	20.9	21.2
20.0	20.5	20.9	21.2	21.7	900	21.7	22.1	22.4	23.1	23.4
22.0	22.5	22.7	23.0	23.7	1000	23.7	24.1	24.3	24.9	26.3
23.9	24.4	24.7	25.0	25.6	1100	25.6	26.0	26.1	26.7	27.3
25.7	26.3	26.5	27.3	NS	1200	NS	NS	NS	NS	NS

NOTES: 1. NS INDICATES NON-STICKABLE.
2. DRIP STICK READINGS IN INCHES.

.22.02.12.090

Main and Replenishing Tanks No. 3 Drip Stick Measurement Tables (Fuselage Level)
Figure 209

FUEL TANK DRIP STICK MEASUREMENT TABLES
AIRPLANE FUSELAGE LEVEL FORWARD AND AFT

INBOARD DRIP STICK MEASUREMENTS (MAIN TANK)

RIGHT WING LOW (DRIP STICK READINGS)					GALLONS	RIGHT WING HIGH (DRIP STICK READINGS)				
2°	1.5°	1°	0.5°	0°		0°	0.5°	1°	1.5°	2°
0.6	0.6	0.5	0.3	0.2	300	0.2	NS	NS	NS	NS
2.0	2.0	2.0	2.0	1.9	400	1.9	1.9	1.6	1.5	1.3
3.1	3.1	3.2	3.3	3.3	500	3.3	3.3	3.1	3.1	3.0
4.1	4.2	4.3	4.6	4.6	600	4.6	4.6	4.6	4.6	4.6
5.2	5.3	5.6	5.8	5.8	700	5.8	6.0	6.0	6.0	6.0
6.3	6.5	6.7	6.9	7.0	800	7.0	7.3	7.3	7.3	7.4
7.2	7.5	7.6	8.0	8.1	900	8.1	8.5	8.6	8.6	8.9
7.8	8.2	8.4	8.8	9.1	1000	9.1	9.4	9.6	9.8	10.2
8.5	8.8	9.2	9.5	10.0	1100	10.0	10.3	10.7	10.9	12.0
9.4	9.8	10.0	10.4	10.9	1200	10.9	11.4	11.8	12.2	13.7
10.4	10.8	11.1	11.5	11.9	1300	11.9	12.6	13.1	13.6	NS
11.5	11.9	12.2	12.7	13.1	1400	13.1	NS	NS	NS	NS
12.1	12.9	12.9	13.4	13.8	1450	13.8	NS	NS	NS	NS
NS	NS	NS	NS	NS	1500	NS	NS	NS	NS	NS

OUTBOARD DRIP STICK MEASUREMENTS (MAIN TANK)

RIGHT WING LOW (DRIP STICK READINGS)					GALLONS	RIGHT WING HIGH (DRIP STICK READINGS)				
2°	1.5°	1°	0.5°	0°		0°	0.5°	1°	1.5°	2°
1.1	0.1	NS	NS	NS	1000	NS	NS	NS	NS	NS
2.5	1.5	0.4	NS	NS	1100	NS	NS	NS	NS	NS
3.5	2.7	1.6	0.7	NS	1200	NS	NS	NS	NS	NS
4.4	3.5	2.6	1.5	0.6	1300	0.6	NS	NS	NS	NS
5.1	4.2	3.2	2.4	1.6	1400	1.6	0.7	0.1	NS	NS
5.8	5.0	3.9	3.4	2.7	1500	2.7	2.0	1.4	1.1	0.4
6.7	5.9	5.3	4.6	4.0	1600	4.0	3.7	3.1	2.9	2.4
8.5	7.9	7.4	7.0	6.4	1700	6.4	6.3	6.0	5.8	5.5
NS	NS	9.8	9.8	9.6	1775	9.6	9.5	9.3	9.2	9.2

REPLENISHING TANK NO. 4

RIGHT WING LOW (DRIP STICK READINGS)					GALLONS	RIGHT WING HIGH (DRIP STICK READINGS)				
2°	1.5°	1°	0.5°	0°		0°	0.5°	1°	1.5°	2°
2.2	2.7	3.0	3.4	3.6	100	3.6	3.9	4.3	4.7	4.8
5.0	5.6	6.1	6.6	7.0	200	7.0	7.5	7.9	8.2	8.5
6.5	7.2	7.9	8.5	NS	300	NS	NS	NS	NS	NS
7.7	8.3	8.9	NS	NS	400	NS	NS	NS	NS	NS

NOTES: 1. NS INDICATES NON-STICKABLE.
2. DRIP STICK READINGS IN INCHES.
3. FIGURES INSIDE HEAVY LINE INDICATE RECOMMENDED DRIP STICK READING RANGE.

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Main and Replenishing Tanks No. 4 Drip Stick Measurement Tables (Fuselage Level)
Figure 210

ENGINE SERVICING

TABLE 1 - ENGINE AND CONSTANT SPEED DRIVE (CSD) OIL TANK DATA

Engine Oil Tank	U. S. Gallons (Each Tank)	Imperial Gallons (Each Tank)	Liters (Each Tank)
Oil Capacity	4.15	3.45	15.7
Volume	5.41	4.50	20.4
Expansion Space	1.26	1.0	4.76
Constant Speed Drive (CSD) Oil Tank	**U. S. Gallons (Each Tank)**	**Imperial Gallons (Each Tank)**	**Liters (Each Tank)**
Oil Capacity	1.72	1.43	6.51
Volume	2.20	1.83	8.33
Expansion Space	0.50	0.41	1.89

1. Filling - Draining Engine and Constant Speed Drive (CSD) Oil Systems

   A. General.

   When servicing the engine and constant speed drive oil systems, always observe the following:

   WARNING: OPEN FLAMES, SPARKS OR SMOKING MUST BE PROHIBITED WITHIN 50 FEET OF OIL SERVICING AREA.

   CAUTION: AVOID INTERMIXING OF DIFFERENT BRANDS OF SYNTHETIC OILS. OILS CONTAINING ETHYL ANTIOXIDANT 703 STORAGE STABILITY ADDITIVE SHOULD NEVER BE MIXED WITH HIGH ACID TYPE OILS. COMBINATION OF HIGH ACID TYPE OILS AND THE 703 ADDITIVE CAN POSSIBLY CAUSE FORMATION OF A PRECIPITATE THAT CAN CAUSE CLOGGING OF ENGINE FILTERS AND SCREENS AND POSSIBLE ENGINE FAILURE. (MIL-L-7808C AND D SHOULD NOT BE INTERMIXED.)

   WARNING: MIL-L-7808 OIL IS TOXIC, AND REMOVES PAINT. ALWAYS WIPE UP ANY SPILLED OIL IMMEDIATELY; WASH WITH SOAP AND WATER IF OIL CONTACTS SKIN.

   B. Equipment Required.

   (1) Work stand to reach engine oil tank fillers.

   (2) Length of hose to attach to oil tank drain valves.

   (3) Six-gallon container to collect oil drained from tanks.

   (4) Oil - Specification MIL-L-7808. Brand names and numbers listed below are approved by Convair:

   *(a) Esso Turbo Oil 15.

*High acid type.

*(b) Esso Turbo Oil TJ-15.

(c) Enco Turbo Oil TJ-15 (Formerly Humble Turbo Oil TJ-15).

(d) Texaco Synthetic Aircraft Turbine Oil 15.

(e) Shell Aircraft Turbine Oil 300 and 302.

(f) Castrol 3C Gas Turbine Lubricant.

**(g) Sinclair Turbo-S Oil.

**(h) B. P. Aero Turbine Oil 15.

C. Fill Engine and CSD Oil Tanks (see Figure 201).

(1) Check oil quantity in tanks immediately after each flight to preclude possibility of overfilling oil systems.

NOTE: Erroneous oil quantity readings may register both in the CSD and engine oil tank compartments if their levels are not checked immediately after shut-down. The CSD oil system quantity may be determined by motoring the engine at 15 percent RPM or above for 30 seconds. To be assured of an accurate engine oil level the engine should be run at idle RPM for a brief period. If it is at all suspected that either system will not be readable after motoring or running, then the systems should be drained and refilled to their prescribed levels before operation.

(2) Fill engine and CSD oil tanks to their proper levels. Check quantity readings on dip sticks to prevent overfilling tanks; refer to Table I, this section, for tank capacities.

D. Drain Engine and CSD Oil Tanks (see Figure 201).

(1) Open pod right door.

(2) Attach hose to drain valves at bottom of oil tanks.

(3) Open drain valves and drain oil into container.

NOTE: Oil tanks will drain completely.

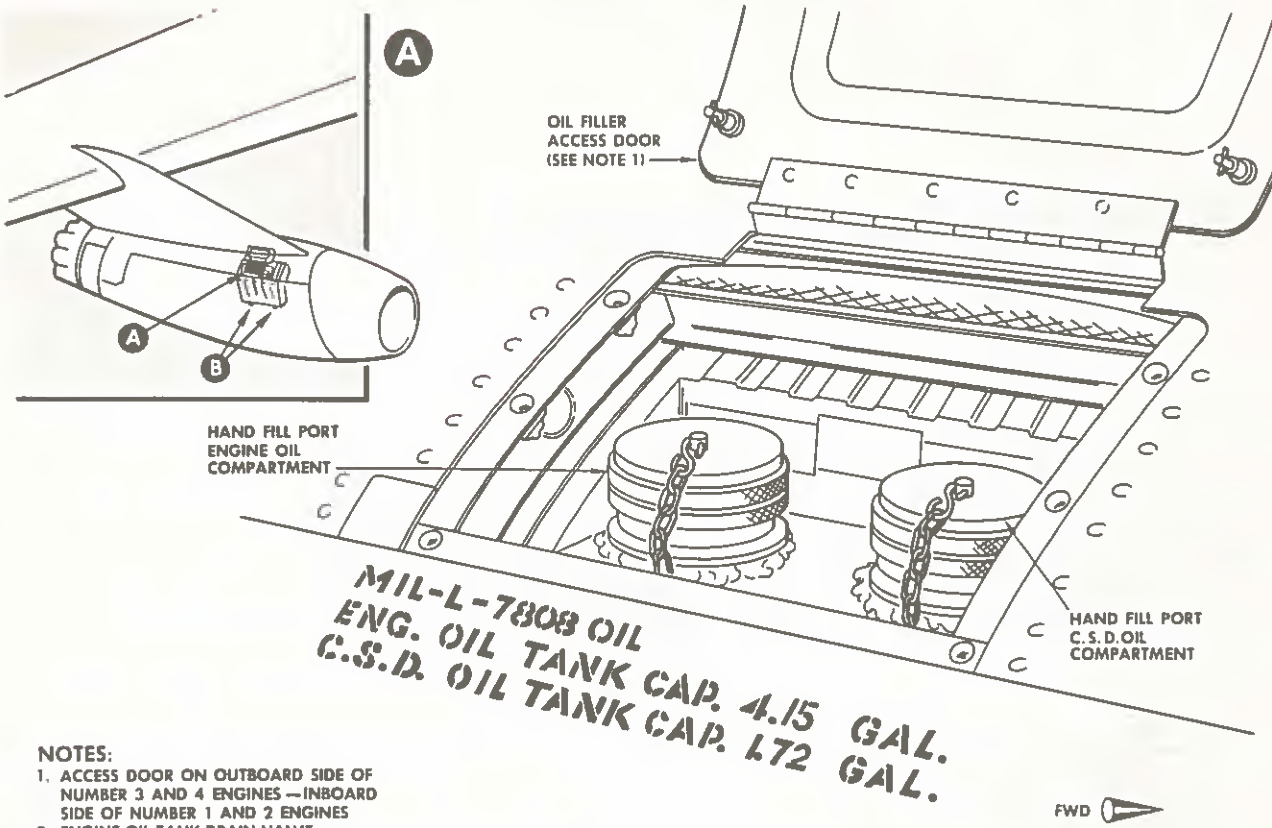
E. Drain CSD Sump and Reservoir (see Figure 202).

(1) Drain CSD oil sump and reservoir periodically to check for oil contamination.

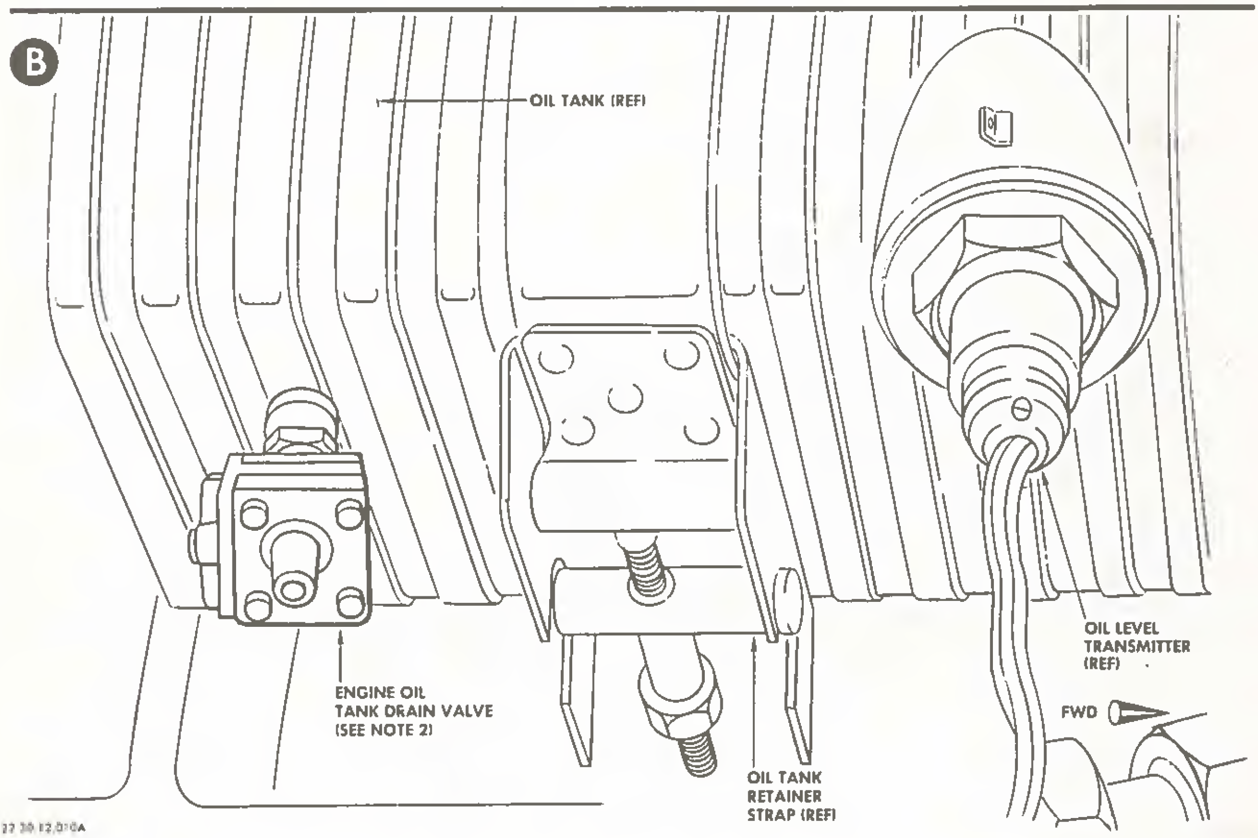
NOTE: Container used to collect oil drained from sump and reservoir must be clean to permit a thorough check of oil for contamination.

(2) Cut safety wire and remove CSD oil sump and reservoir drain plugs.

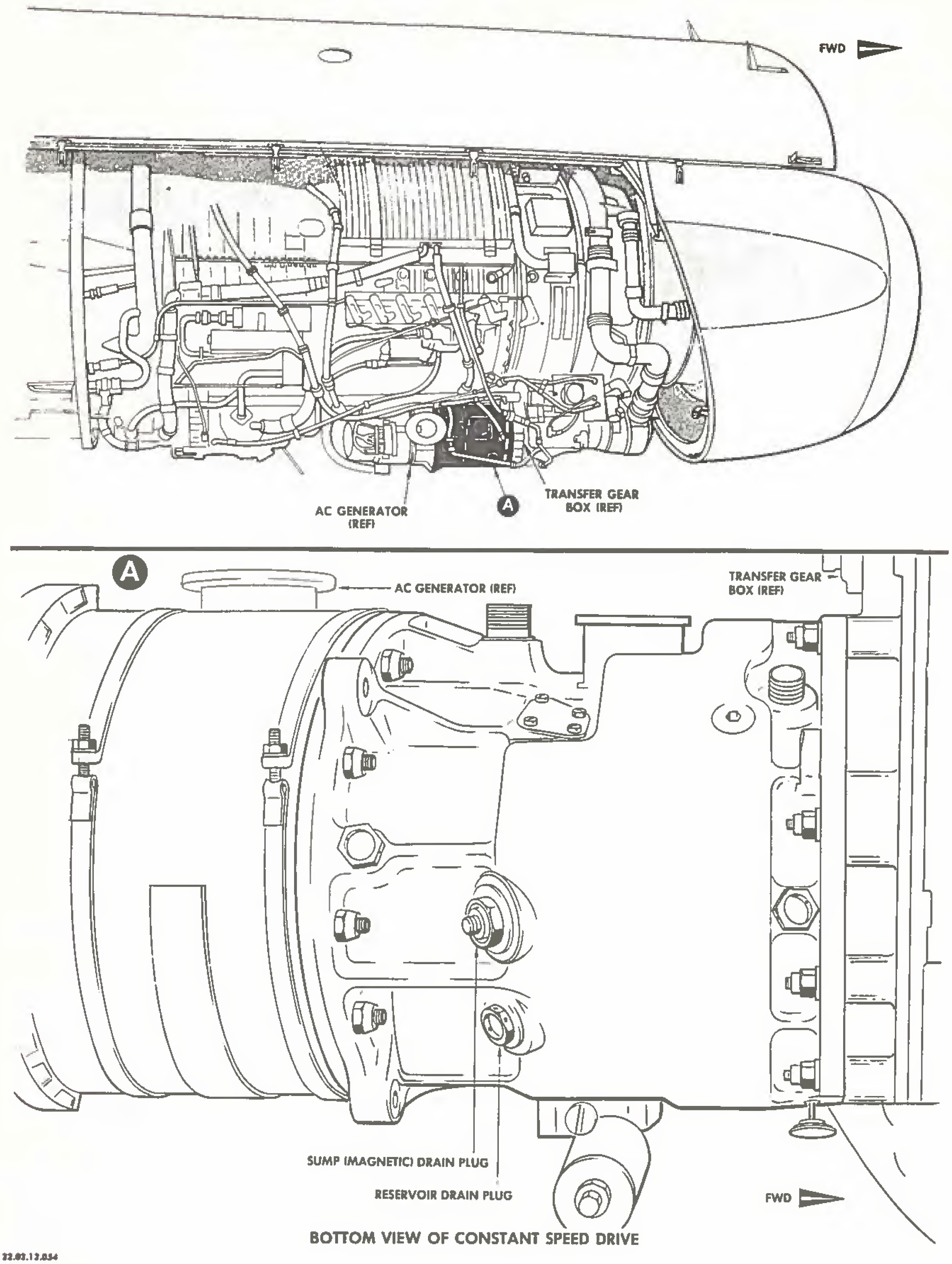
*High acid type.
**Contains Ethyl antioxidant 703 additive.



NOTES:
1. ACCESS DOOR ON OUTBOARD SIDE OF NUMBER 3 AND 4 ENGINES —INBOARD SIDE OF NUMBER 1 AND 2 ENGINES
2. ENGINE OIL TANK DRAIN VALVE SHOWN—CSD OIL TANK DRAIN VALVE IDENTICAL.



Servicing Engine and Constant
Speed Drive Oil System
Figure 201



Servicing Constant Speed Drive
Sump and Reservoir
Figure 202

(3) Completely drain oil into container and check for contamination.

CAUTION: IF OIL IS CONTAMINATED, REMOVE CSD UNIT FOR OVERHAUL; REFER TO CHAPTER 24, ELECTRICAL POWER. ALSO, PRIOR TO INSTALLING REPLACEMENT CSD UNIT, DRAIN AND FLUSH ENTIRE OIL SYSTEM; REFER TO PARAGRAPH D.

(4) Install and safety CSD oil sump (magnetic) plug and reservoir drain plug; use new O rings on plugs on installation.

NOTE: If engine is to be run in less than one-half hour after CSD is drained, disconnect vent port line on top side of CSD and add one quart of oil (MIL-L-7808C) through vent port. Reinstall vent port line after adding oil.

(5) Close pod right door (refer to Chapter 54, NACELLES).

2. Filling - Draining Engine Starter (see Figure 203)

A. General.

If the engine starter oil level is low, drain starter and refill with oil (do not add) as outlined in Paragraph D. The starter oil shall be drained completely periodically to permit a thorough examination of the oil for contamination.

B. Equipment Required.

(1) One-quart container to collect starter oil.

NOTE: Container must be absolutely clean.

(2) Graduated beaker (or equivalent) to measure oil quantity.

(3) Oil, Specification MIL-L-7808 or equivalent.

C. Drain Starter Oil.

(1) Cut safety wire and remove oil fill and magnetic drain plugs from starter; allow oil in sump to drain completely into a clean container.

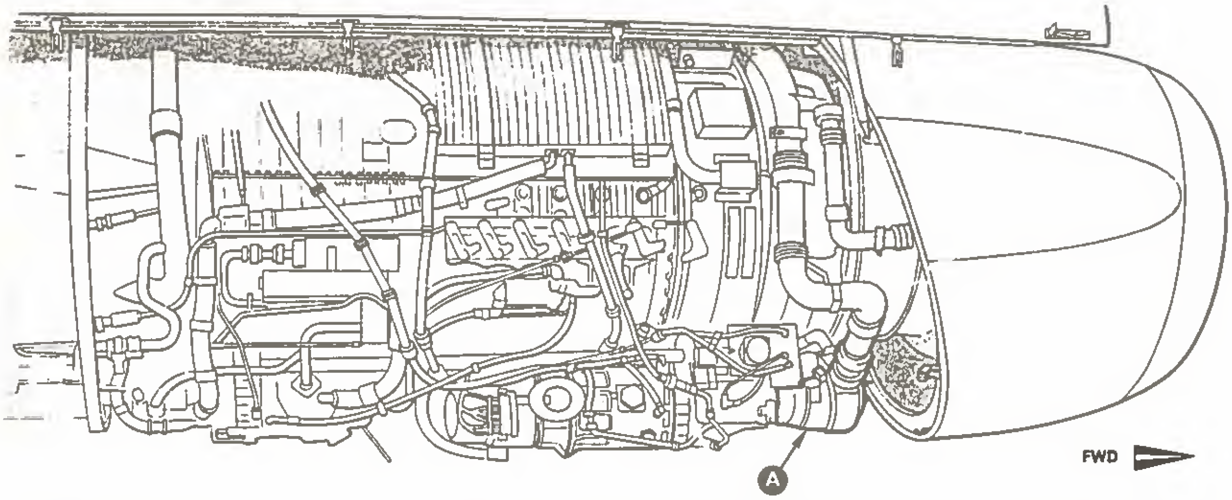
(2) Thoroughly examine magnetic drain plug for gritty material or metal particles.

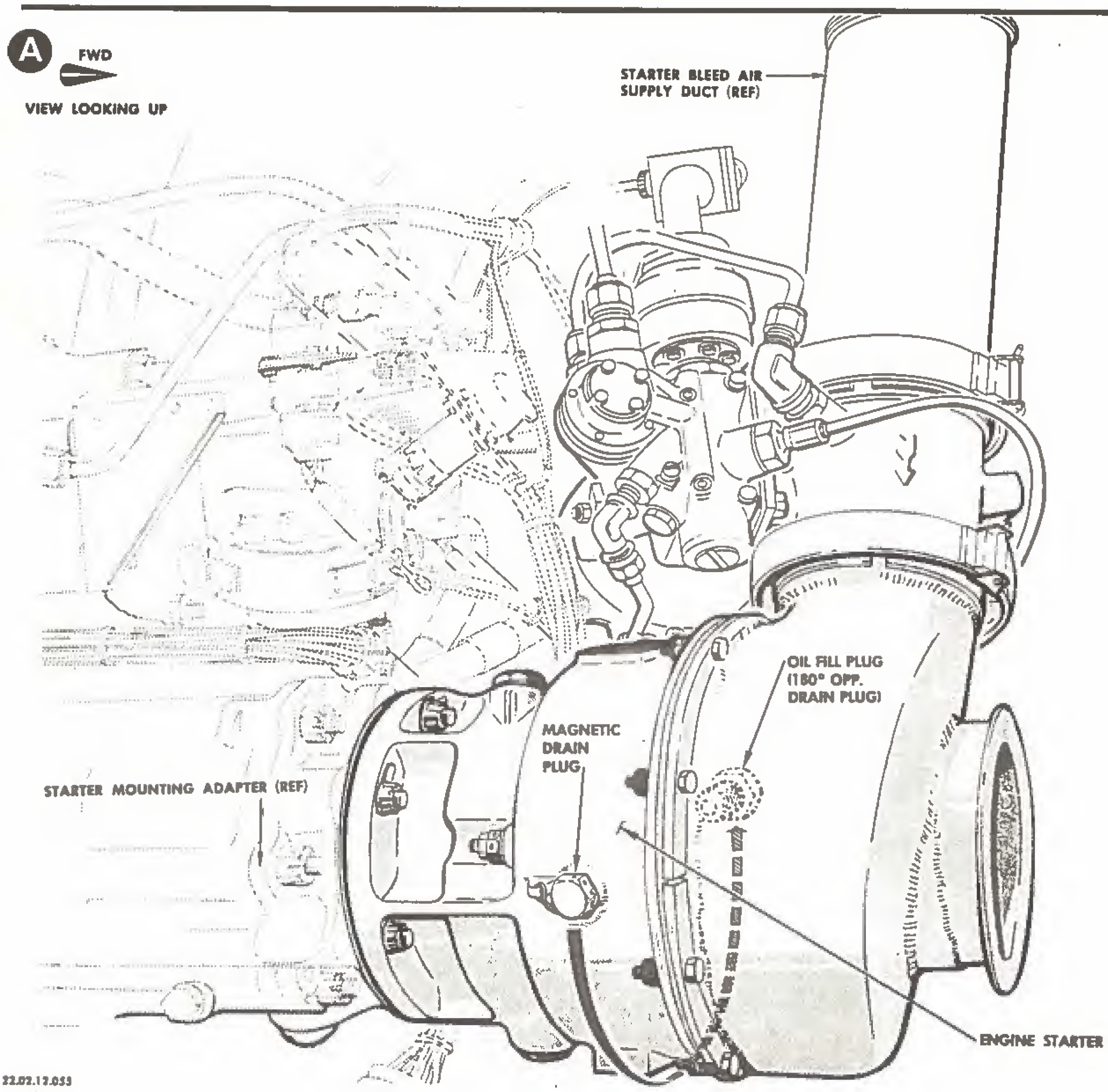
NOTE: Fine metal particles are an indication of normal gear wear. If large particles are present, replace starter (refer to Chapter 80, STARTING).

(3) Clean magnetic drain plug thoroughly; install and safety-wire drain plug.

D. Fill Starter.

CAUTION: DO NOT ADD OIL TO STARTER. PERFORM THE FOLLOWING STEPS TO AVOID OVERFILLING.





Servicing Engine Starter
Figure 203

(1) Drain oil from starter sump completely, as outlined in Paragraph C.

(2) Refill starter with exactly 350 cc of oil, Specification MIL-L-7808, or equivalent.

NOTE: Do not fill starter oil sump to oil fill plug level. Use a graduated beaker (or equivalent) to measure exact quantity of oil.

(3) Install and safety-wire oil fill plug.

FIRE EXTINGUISHING SYSTEMS - SERVICING

1. Engine Fire Extinguishing System Servicing

A. General.

Servicing the engine (pylon-located) fire extinguishing agent (bromotrifluoromethane) containers consists primarily of checking the containers for general security and proper precharge. The containers (one in each pylon) are located immediately forward of the fuel system refuel control panel in the inboard pylons, and in the same relative position in the outboard pylons. Each container is equipped with an integral pressure gage to facilitate servicing and to detect pressure loss. The pressure gage dial may be painted black if Service Bulletin No. 26-16 has been accomplished. This service bulletin removes the gage indicator needle and pinion gear.

B. Equipment Required - None.

C. Service Engine Fire Extinguishing Agent Container (see Figure 201).

(1) Check pressure gage on container for acceptable limits per PRESSURE vs TEMPERATURE chart (see Figure 202).

(2) If container pressure is above or below specified limits, replace container (refer to Chapter 26, FIRE PROTECTION).

2. Portable Liquid Fire Extinguisher Servicing (see Figure 203)

A. General.

Servicing the portable liquid fire extinguishers consists of checking the weight of the CO_2 cartridge, and checking for corrosion or damage to the cartridge. The liquid extinguishers are located in the passenger cabin area as follows: one on the aft bulkhead inside the forward entrance area coat closet, and two on the floor on the left side of the airplane immediately forward of the main passenger cabin aft bulkhead.

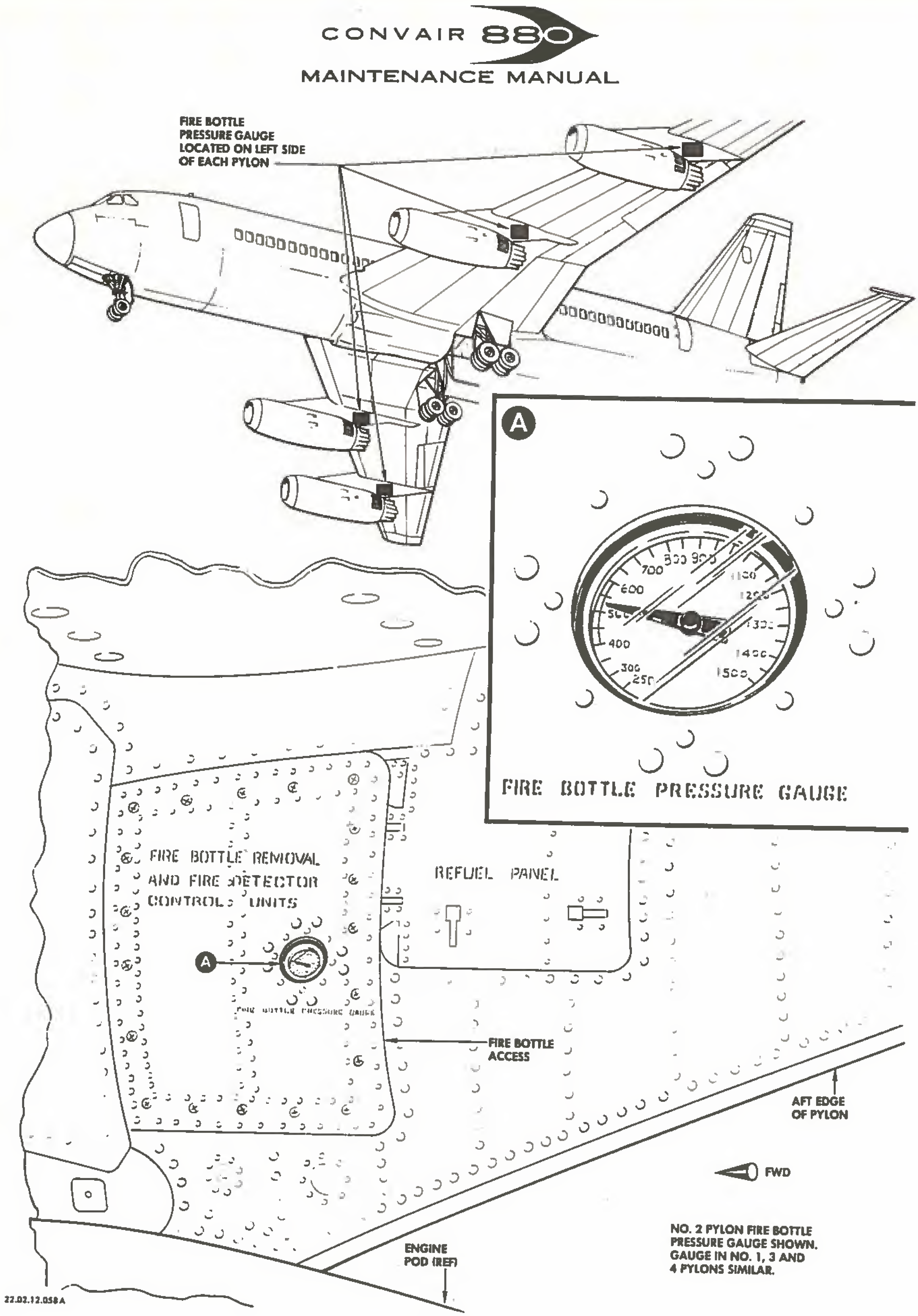
B. Equipment Required - None.

C. Service Liquid Fire Extinguishers.

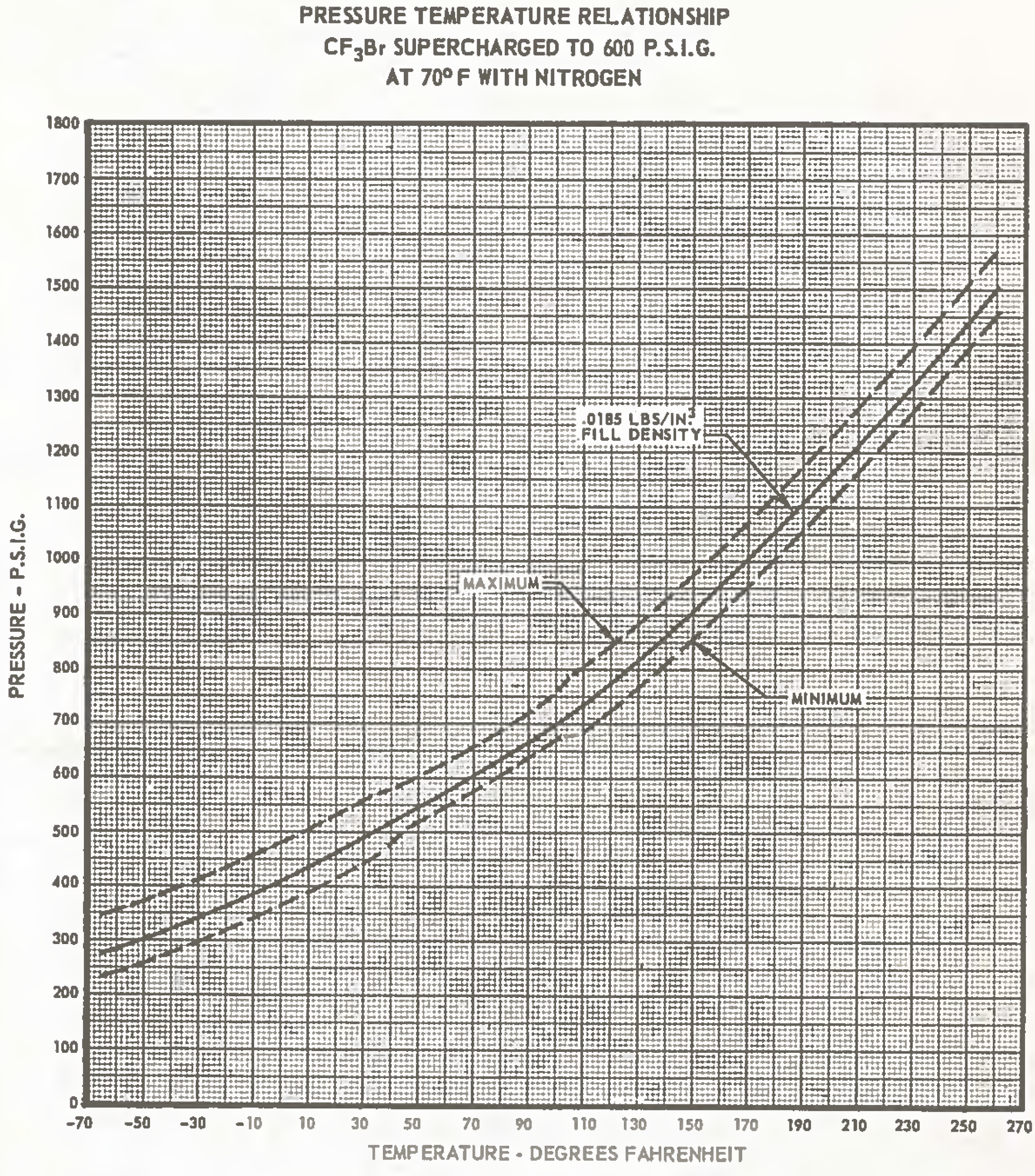
Remove CO_2 cartridge from cartridge holder (extinguisher handle) every six months and check cartridge as follows:

(1) Remove safety wire from cartridge holder (cylindrical handle) and unscrew holder from extinguisher valve body; remove CO_2 cartridge and spring.

(2) Check inspection record of CO_2 cartridge (stamped on cartridge) for expiration of six-month weighing interval.



Engine (Pylon)
Fire Extinguisher Pressure Gages
Figure 201



GAUGE FULL SCALE READING 1500 P.S.I.

GAUGE TOLERANCES

± 2% OR 30 P.S.I. BETWEEN 500 AND 700 P.S.I.

± 3% OR 45 P.S.I. REMAINDER OF SCALE

CHARGING TOLERANCE

+ 25 − 0 P.S.I.

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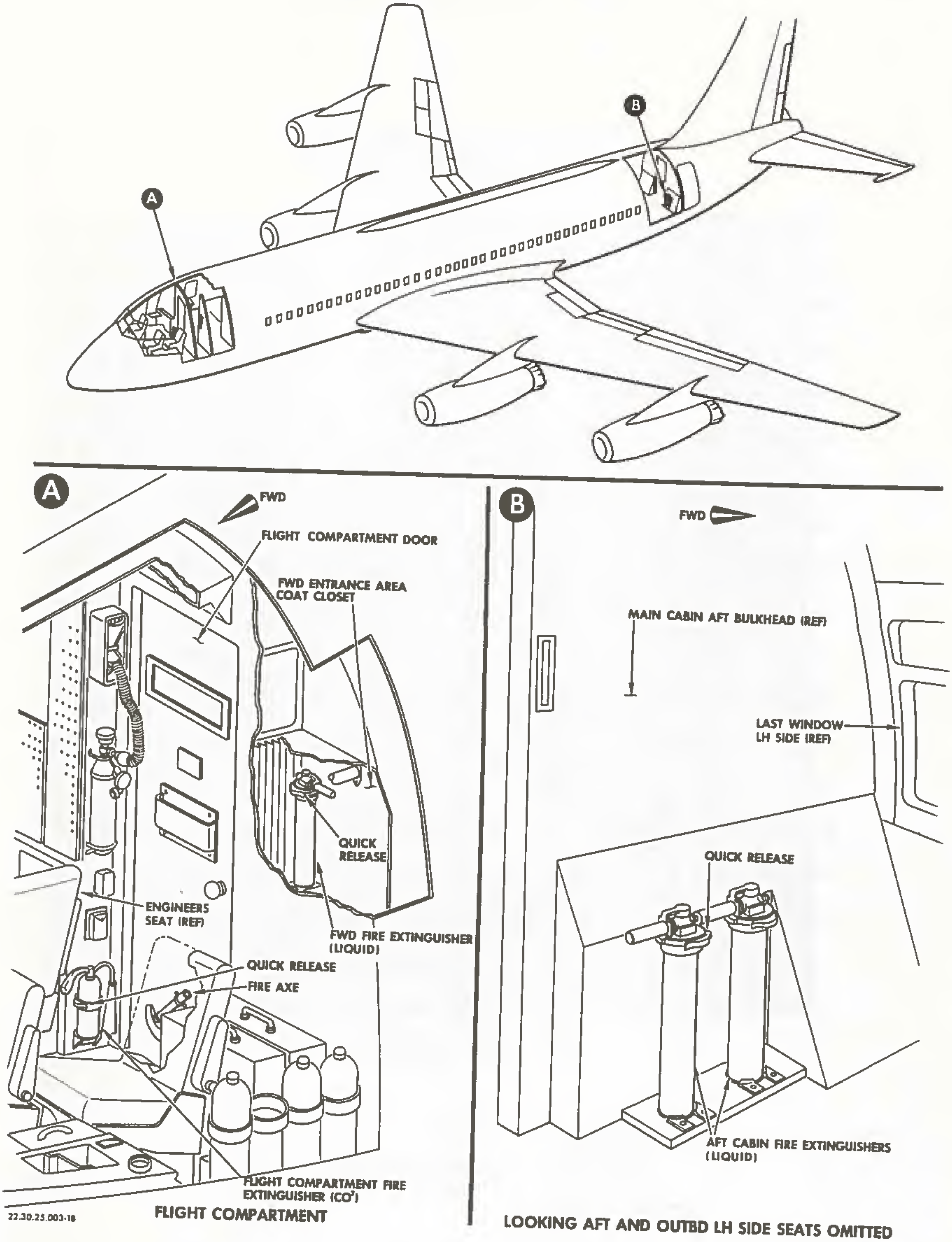
Engine Fire Extinguisher Charge vs Temperature
Figure 202



Portable Fire Extinguishers
Figure 203

(3) Weigh cartridge every six months; if weight of cartridge is less than minimum weight stamped on cartridge, replace cartridge.

(4) Check cartridge for damage or corrosion; replace cartridge if damaged or corroded.

(5) Remove liquid from extinguisher and refill with 1 3/8 quarts of clean water or anti-freeze solution.

(6) Insert spring into holder and insert discharge end of cartridge into valve body receptacle. Place holder over cartridge and turn holder until red line on holder matches red line on valve body; safety-wire cartridge holder to valve body.

3. Portable CO_2 Fire Extinguisher Servicing (see Figure 203)

A. General.

Servicing the CO_2 extinguisher consists of weighing the extinguisher periodically. One CO_2 extinguisher is located on the right side of the flight compartment immediately inside the compartment access door.

B. Equipment Required - None.

C. Service CO_2 Extinguisher.

(1) Check inspection record for expiration of six-month weighing interval.

(2) Weigh extinguisher every six months; if weight has decreased below amount indicated on name plate strap, replace extinguisher with serviceable unit.

HYDRAULIC SYSTEM SERVICING

TABLE I - HYDRAULIC RESERVOIR DATA

QUANTITY (MEASURABLE)	U.S. Gallons	Imperial Gallons	Liters
Reservoir No. 1			
FULL SYS DEPRESS'D	2.4	2.0	9.1
FULL SYS CHG	1.5	1.3	5.7
Reservoir No. 2			
FULL SYS DEPRESS'D	6.7	5.6	25.4
FULL SYS CHG	4.6	3.8	17.4
TOTAL VOLUME			
Reservoir No. 1	4.0	2.5	15.1
Reservoir No. 2	11.8	9.73	44.6
RESERVE CONTENTS			
(NOT MEASURABLE)			
Reservoir No. 1	1.0	0.83	3.8
Reservoir No. 2	1.9	1.58	6.8
EXPANSION SPACE			
Reservoir No. 1	0.6	0.4	2.2
Reservoir No. 2	3.4	2.8	12.8

1. Filling - Draining Hydraulic Reservoirs (see Figure 201)

A. General.

Hydraulic fluid can be added to the system with a hand pump through the remote filler connection, or from a container through the FILL port at the top of the No. 1 reservoir. Use of the remote filler is preferable since the fluid is forced through the 50 micron fill filter prior to entering the system. Fluid which is added through the FILL port at the top of the No. 1 reservoir passes through only an 80 mesh screen.

When adding fluid to the hydraulic system, fill to FULL level mark on sight gage that corresponds with the condition of the airplane hydraulic system as described on the sight gage placard.

2. Filling Hydraulic System Through Remote Filler Connection (see Figure 202)

A. Equipment Required. External supply of Skydrol 500A hydraulic fluid and hand pump.

NOTE: External hydraulic fluid supply filler hose must be equipped to couple with 305503-S11-6D self sealing remote filler connection.

B. Fill System

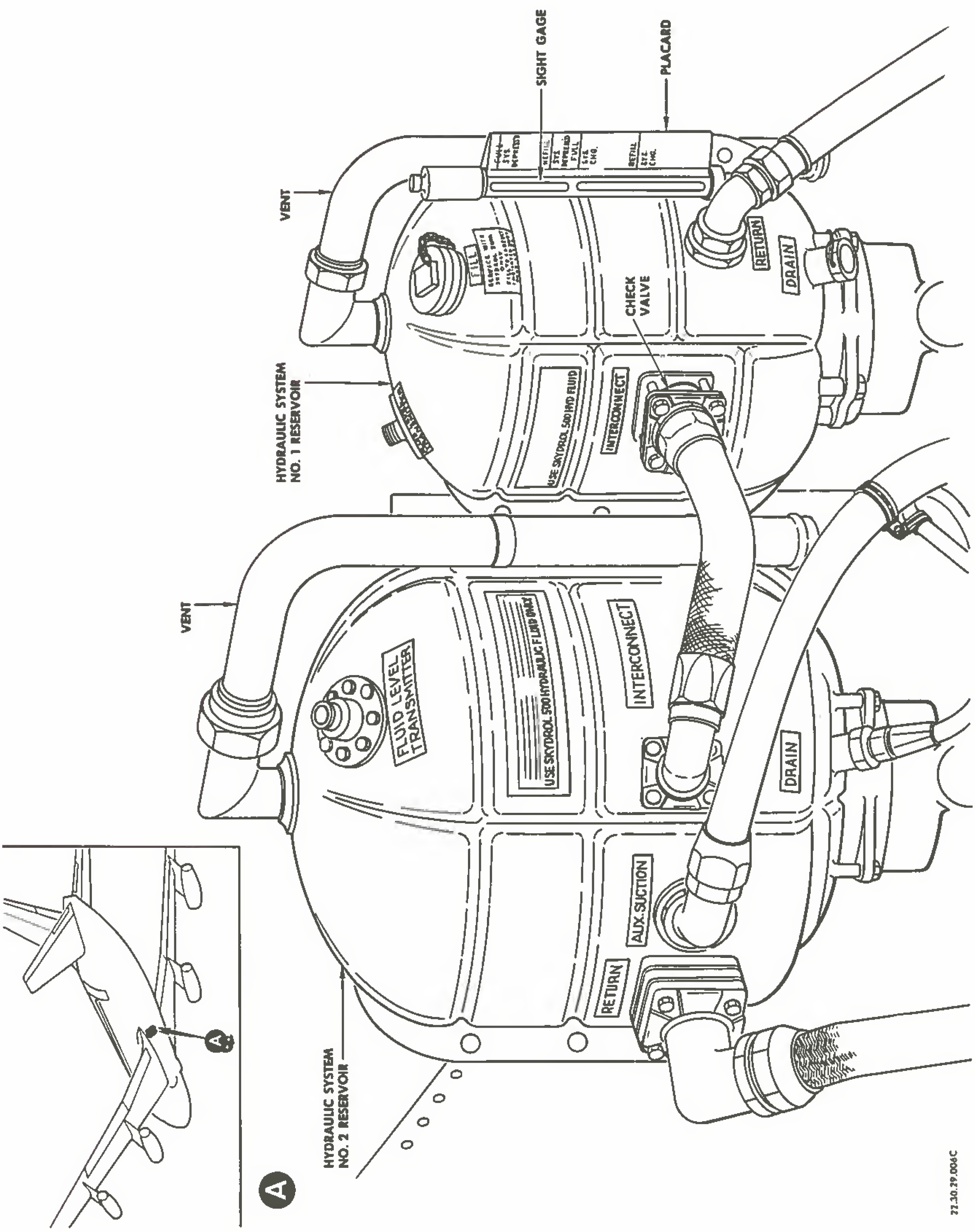
(1) Open hydraulic compartment door.

(2) Remove cap from HYD SYS. REMOTE FILL connection.

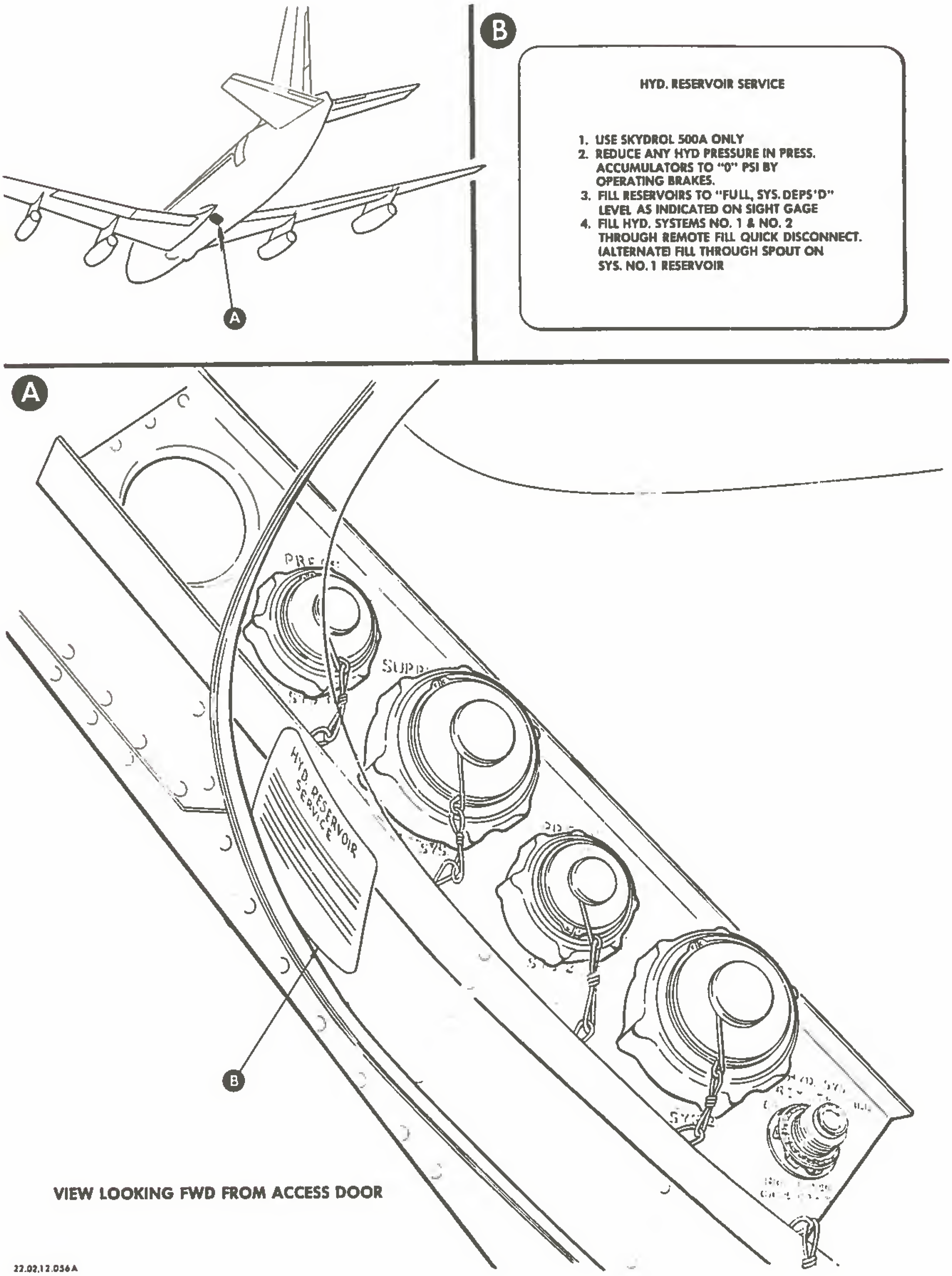
(3) Connect hand pump filler hose to HYD SYS. REMOTE FILL connection on airplane.

(4) Determine condition of hydraulic system.

NOTE: Prior to filling reservoirs, the hydraulic system must be either fully pressurized or fully depressurized. Determine hydraulic system condition by checking the No. 1 and No. 2 hydraulic system pressure gages and the brake pressure gage located on the copilot's instrument panel. If the hydraulic system is depressurized, and the brake pressure gage indicates pressure, operate wheel brakes until brake pressure is 0 psig. If the hydraulic system is depressurized, allow approximately one-half hour for fluid level of No. 1 and No. 2 reservoirs to stabilize prior to filling.



Hydraulic Reservoirs
Figure 201



Hydraulic System Remote Fill Connections
Figure 202

(5) Fill reservoirs to FULL level determined in step (4).

NOTE: When filling the reservoirs with both the No. 1 and No. 2 hydraulic systems pressurized, use slow applications of hand pump to permit fluid to "level-out in reservoirs.

(6) Disconnect hand pump filler hose from HYD SYS REMOTE FILL connection; replace HYD SYS REMOTE FILL connection cap.

3. Filling Hydraulic System Manually Through No. 1 Reservoir Fill Port

A. Equipment Required.

(1) One or two gallon container filled with Skydrol 500A hydraulic fluid.

NOTE: Both container and hydraulic fluid must be clean.

(2) Clean funnel.

B. Fill System.

(1) Open hydraulic compartment door.

(2) Determine condition of hydraulic system.

NOTE: Prior to filling reservoirs, the hydraulic system shall be either fully pressurized or fully depressurized. Determine hydraulic system condition by checking the No. 1 and No. 2 hydraulic system pressure gages and the brake pressure gage located on the copilot's instrument panel. If the hydraulic system is depressurized, and the brake pressure gage indicates pressure, operate wheel brakes until brake pressure is 0 psig. If the hydraulic system is depressurized, allow approximately one-half hour for fluid level of No. 1 and No. 2 reservoirs to stabilizer prior to filling.

(3) Remove filler cap from top of No. 1 reservoir.

(4) Insert funnel in reservoir filler using care to not damage filter screen.

(5) Fill reservoirs to FULL level determined in step (2).

NOTE: When filling the reservoirs with both the No. 1 and No. 2 hydraulic systems pressurized, use slow applications of hand pump to permit fluid to "level-out in reservoir.

(3) Disconnect external hydraulic power source from airplane.

(4) Gain access to hydraulic compartment.

(5) Disconnect No. 2 reservoir-to-hydraulic auxiliary pump flex line at the No. 2 reservoir; drain reservoir until fluid level in sight gage on No. 1 reservoir is 1/4 inch below REFIL SYS CHG level.

NOTE: Use funnel and length of hose to drain fluid into container located outside of airplane.

(6) Connect flex line to reservoir.

(7) Disconnect No. 1 reservoir-to-hydraulic auxiliary pump flex line at the No. 1 reservoir; drain until reservoir is empty.

NOTE: Use funnel and length of hose to drain fluid into container located outside of airplane.

(8) Connect flex line to reservoir.

C. Drain No. 2 Reservoir.

(1) Perform steps B. (1) through B. (4).

(2) Disconnect No. 2 reservoir-to-hydraulic auxiliary pump flex line at No. 2 reservoir; drain until reservoir is empty.

NOTE: Use funnel and length of hose to drain fluid into container located outside of airplane.

(3) Connect flex line to reservoir.

5. Relieving Hydraulic System Pressure

A. General.

When the source of hydraulic pressure is turned off, the pressure in the system will drop to 0 psi within two minutes, except for that portion of the No. 2 hydraulic system which is downstream of the main landing gear brake pressure check valve. The pressure retained in the main landing gear system by the check valve is relieved by operating the main wheel brakes a minimum of fifteen times.

B. Equipment Required.

(1) Source of external ac electrical power.

C. Relieve No. 1 and No. 2 Hydraulic Systems Pressure.

(1) Before relieving hydraulic system pressure, be sure that:

(a) External source of hydraulic power (if connected to airplane) is turned off.

(b) HYD PUMP switch (on flight engineer's hydraulic control panel) is in OFF position, with warning tag attached (see Figure 203).

(c) All airplane engines are shut down.

(2) Connect and apply external electrical power to airplane (refer to Chapter 24, ELECTRICAL POWER).

(3) Close the following circuit breakers on main circuit breaker panel:

(a) HYD PRESS SYS NO. 1 and SYS NO. 2.

(b) HYD TEMP CONT VALVE SYS NO. 1 and SYS NO. 2.

(c) HYD BRAKE PRESS IND.

(4) Place SYSTEM NO. 1 and SYSTEM NO. 2 TEMP VALVE switches (on flight engineer's hydraulic control panel) in OPEN position.

(5) Operate main landing gear brakes fifteen times, minimum.

NOTE: SYSTEM 1 and SYSTEM 2 HYD PRESS, and BRAKE HYD PRESS gages on copilot's instrument panel shall indicate 0 psi.

(6) Place SYSTEM NO. 1 and SYSTEM NO. 2 TEMP VALVE switches in CLOSE position.

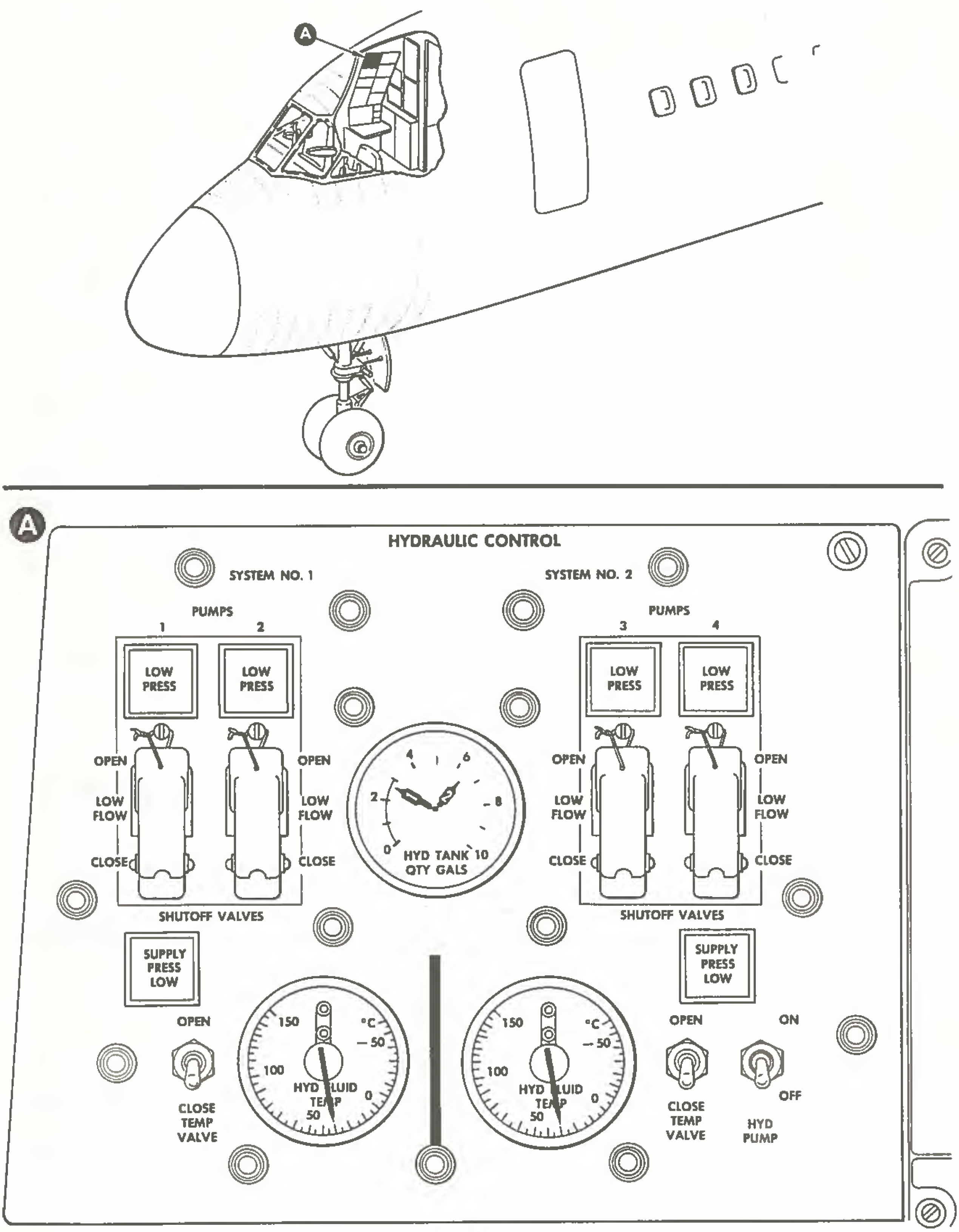
(7) Shut off and remove external electrical power (refer to Chapter 24, ELECTRICAL POWER).

(8) Open circuit breakers closed in step (3).

D. Relieve No. 1 Hydraulic System Pressure.

(1) Before relieving pressure in No. 1 hydraulic system, be sure that:

(a) External source of hydraulic power (if connected to airplane) is turned off.



FLIGHT ENGINEER'S HYDRAULIC CONTROL PANEL

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Flight Engineer's Hydraulic Control Panel
Figure 203

(b) HYD PUMP switch (on flight engineer's hydraulic control panel) is in OFF position, with warning tag attached.

(c) Airplane engines No. 1 and No. 2 are shut down.

(2) Connect and apply external electrical power to airplane (refer to Chapter 24, ELECTRICAL POWER).

(3) Close the following circuit breakers on main circuit breaker panel:

(a) HYD PRESS SYS. NO. 1.

(b) HYD TEMP CONT VALVE SYS. NO. 1.

(4) Place SYSTEM NO. 1 TEMP VALVE switch (on flight engineer's hydraulic control panel) in OPEN position until SYSTEM 1 pressure gage on co-pilot's instrument panel indicates 0 psi.

(5) Place SYSTEM NO. 1 TEMP VALVE switch in CLOSE position.

(6) Shut off and remove external electrical power (refer to Chapter 24, ELECTRICAL POWER).

(7) Close circuit breakers opened in step (3).

E. Relieve No. 2 Hydraulic System Pressure.

(1) Before relieving pressure in No. 2 hydraulic system, be sure that:

(a) External source of hydraulic power (if connected to airplane) is turned off.

(b) HYD PUMP switch (on flight engineer's hydraulic control panel) is in OFF position with warning tag attached.

(c) Airplane engines No. 3 and No. 4 are shut down.

(2) Connect and apply external electrical power to airplane (refer to Chapter 24, ELECTRICAL POWER).

(3) Close the following circuit breakers on main circuit breaker panel:

(a) HYD PRESS SYS NO. 2.

(b) HYD TEMP CONT VALVE SYS NO. 2.

(c) HYD BRAKE PRESS IND.

(4) Place SYSTEM NO. 2 TEMP VALVE switch (on flight engineer's hydraulic control panel) in OPEN position.

(5) Operate main landing gear brakes fifteen times, minimum.

NOTE: SYSTEM 2 and BRAKE HYD PRESS gages on copilot's instrument panel shall indicate 0 psi.

(6) Place SYSTEM NO. 2 TEMP VALVE in CLOSE position.

(7) Shut off and remove external electrical power (refer to Chapter 24, ELECTRICAL POWER).

(8) Close circuit breakers opened in step (3).

6. Charging Hydraulic System Accumulators (see Figure 204)

A. General.

The hydraulic power system accumulators (two) are located immediately inside and forward of the hydraulic compartment access door. Each accumulator is charged separately with nitrogen through an integral filler valve installed on the lower end of each accumulator.

B. Equipment Required. Source of dry filtered nitrogen.

C. Charge Accumulators.

(1) Relieve No. 1 and No. 2 hydraulic systems pressure; refer to Relieving Hydraulic System Pressure.

WARNING: IN STEPS (2) and (4) FOLLOWING, WHEN REMOVING VALVE CAP AND OPENING VALVE, HOLD VALVE BODY FIRMLY WITH WRENCH. A LOOSENED VALVE BODY COULD BE BLOWN OUT BY INTERNAL PRESSURE, CAUSING SERIOUS INJURY OR FATALITY TO PERSONNEL.

(2) Remove cap from accumulator filler valve.

(3) Connect source of dry filtered nitrogen to filler valve; ascertain that connection is secure.

(4) Open accumulator filler valve by turning swivel nut (nut closest to filler line connection) counterclockwise (refer to warning above).

(5) Open valve on external source of nitrogen and charge accumulator to 900 (±25) psig.

(6) Close accumulator filler valve by turning swivel nut (nut closest to filler line connection) clockwise until tight.

(7) Close valve on external source of nitrogen.

LANDING GEAR SERVICING

1. Servicing Landing Gear Shock Struts (see Figures 201 and 202)

A. General.

Servicing the landing gear shock struts consists of adding fluid and air to the struts to maintain them at their proper operating extensions. Also, a daily visual check should be made for signs of air or fluid leakage. When possible, the shock strut pistons should be wiped with a clean, dry, lint free cloth after each landing, to remove dust and other foreign matter. After wiping with a dry cloth, the strut pistons should be coated with a thin film of clean hydraulic fluid, Specification MIL-H-5606 or MIL-H-6083.

B. Equipment Required. Source of dry compressed air or nitrogen.

C. Service Shock Struts.

(1) Remove cap from shock strut air filler valve.

CAUTION: PRIOR TO PERFORMING STEP (2) FOLLOWING, REMOVE ALL WORK STANDS OR OTHER EQUIPMENT FROM THE AREA WHICH MIGHT DAMAGE THE AIRPLANE AS IT SETTLES.

(2) Loosen hex swivel nut on air filler valve one-quarter turn maximum, in a counterclockwise direction; allow all air to escape to fully deflate shock strut.

WARNING: DO NOT LOOSEN OR REMOVE VALVE BODY TO RELEASE AIR PRESSURE. INTERNAL PRESSURE MAY BLOW OUT VALVE BODY AND CAUSE SERIOUS BODILY INJURY OR FATALITY TO SERVICING PERSONNEL.

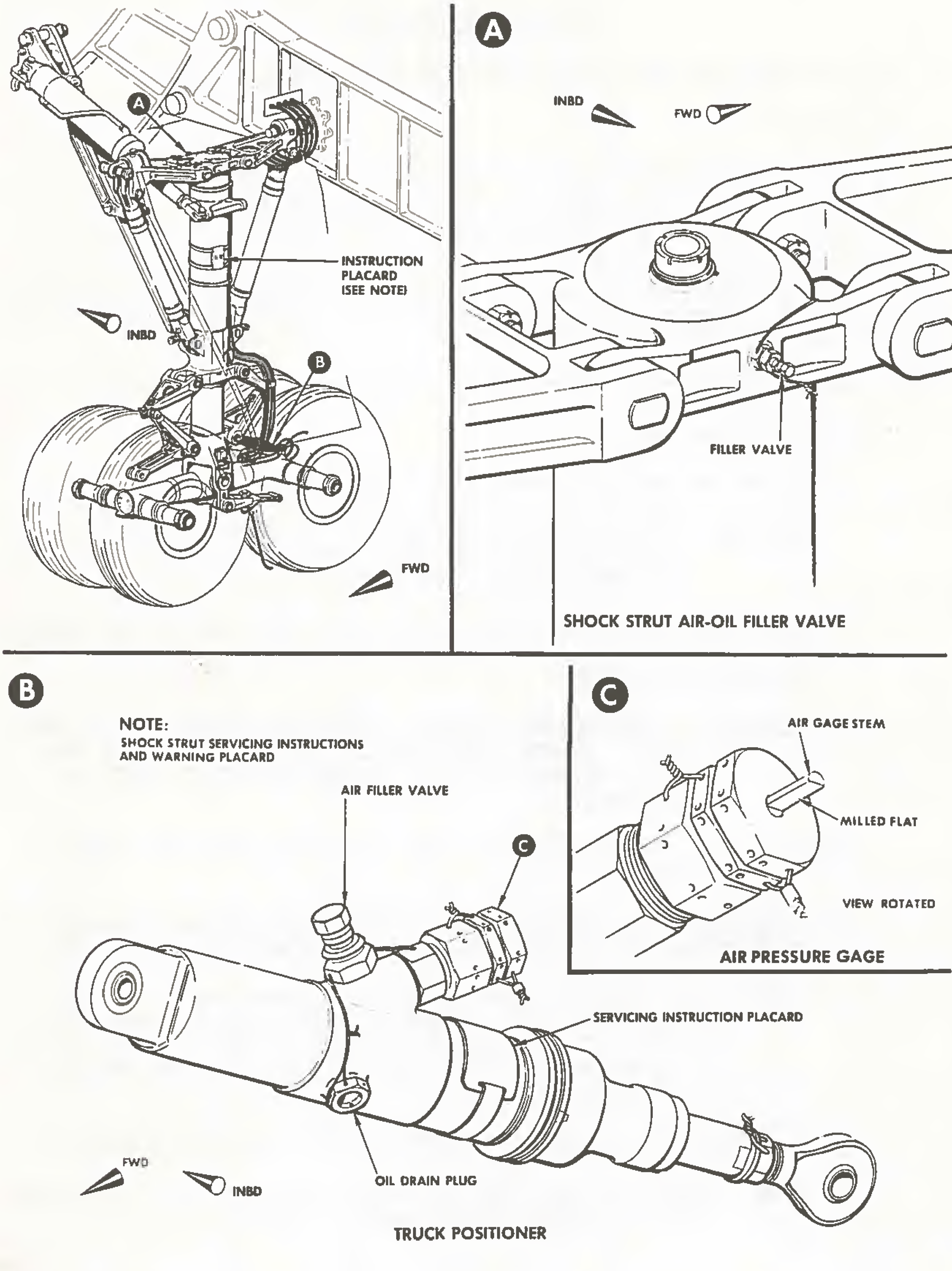
(3) Cut safety wire and remove (screw out) entire air valve assembly from shock strut.

(4) Fill shock strut with hydraulic fluid, Specification MIL-H-5606 or MIL-H-6083, through air valve port until fluid overflows from port.

NOTE: Fluid capacity of the nose landing gear shock strut is approximately 0.925 US gallon (0.870 Imperial gallon, 3.5 liters). The capacity of each main landing gear shock strut is approximately 4.34 US gallons (3.61 Imperial gallons, 16.4 liters).

(5) Allow all air to escape from open port before installing air valve.

NOTE: Foaming of the fluid indicates presence of air. Allow sufficient time for foaming action to stop.



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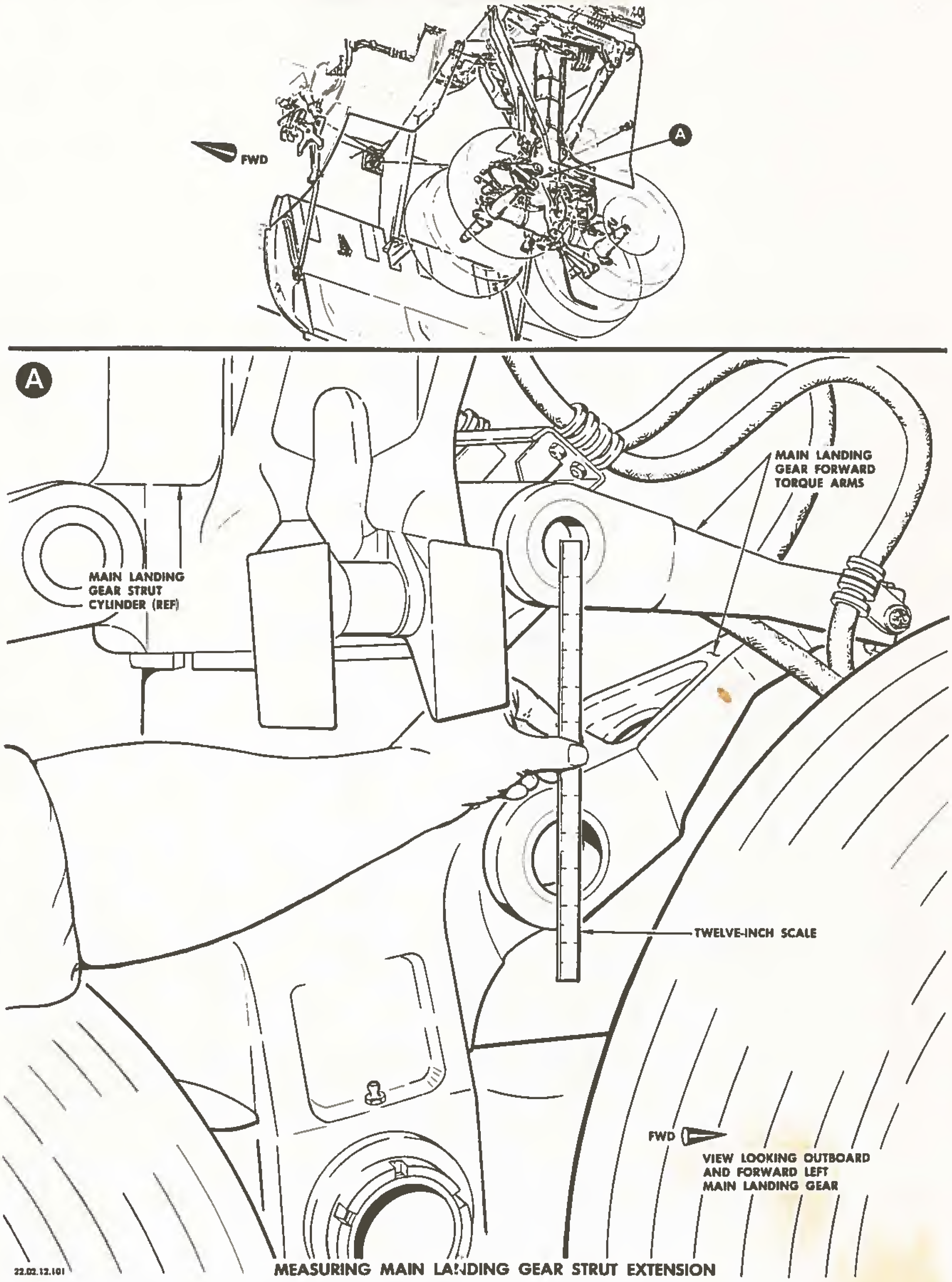
Servicing Main Landing Gear and Truck Positioner
Figure 201 (Sheet 1 of 2)



MEASURING MAIN LANDING GEAR STRUT EXTENSION

Servicing Main Landing Gear and
Truck Positioner
Figure 201 (Sheet 2 of 2)

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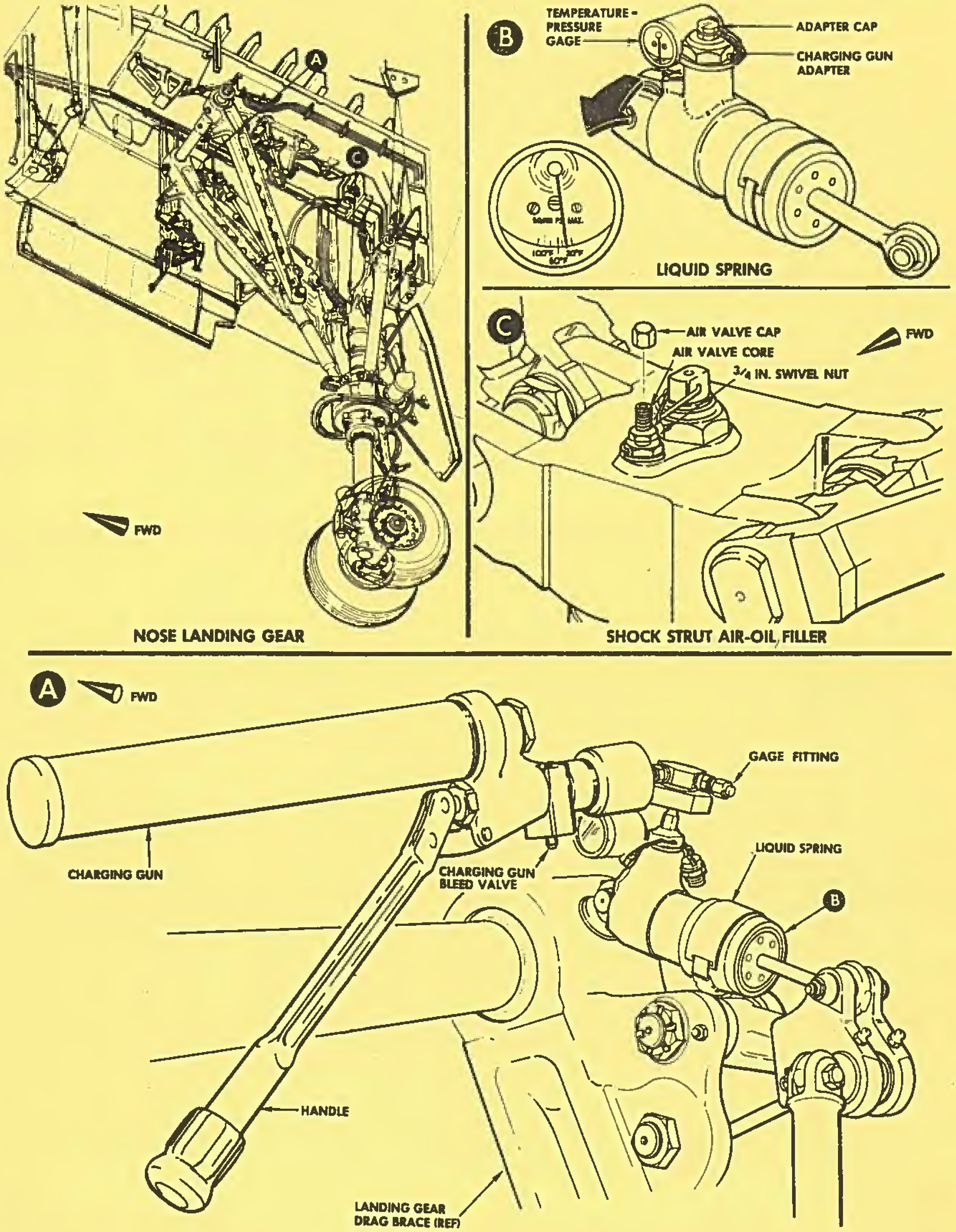
TEMPORARY REVISION NO. 12-42.

Insert facing 12-5-0, Page 202B, dated July 9/62.

The illustration on Sheet 2 of this temporary revision is applicable to airplanes incorporating a nose landing gear liquid spring.

Retain this temporary revision in your manual until all applicable airplanes have been modified per Service Bulletin No. 32-68.

TEMPORARY REVISION NO. 12-42.



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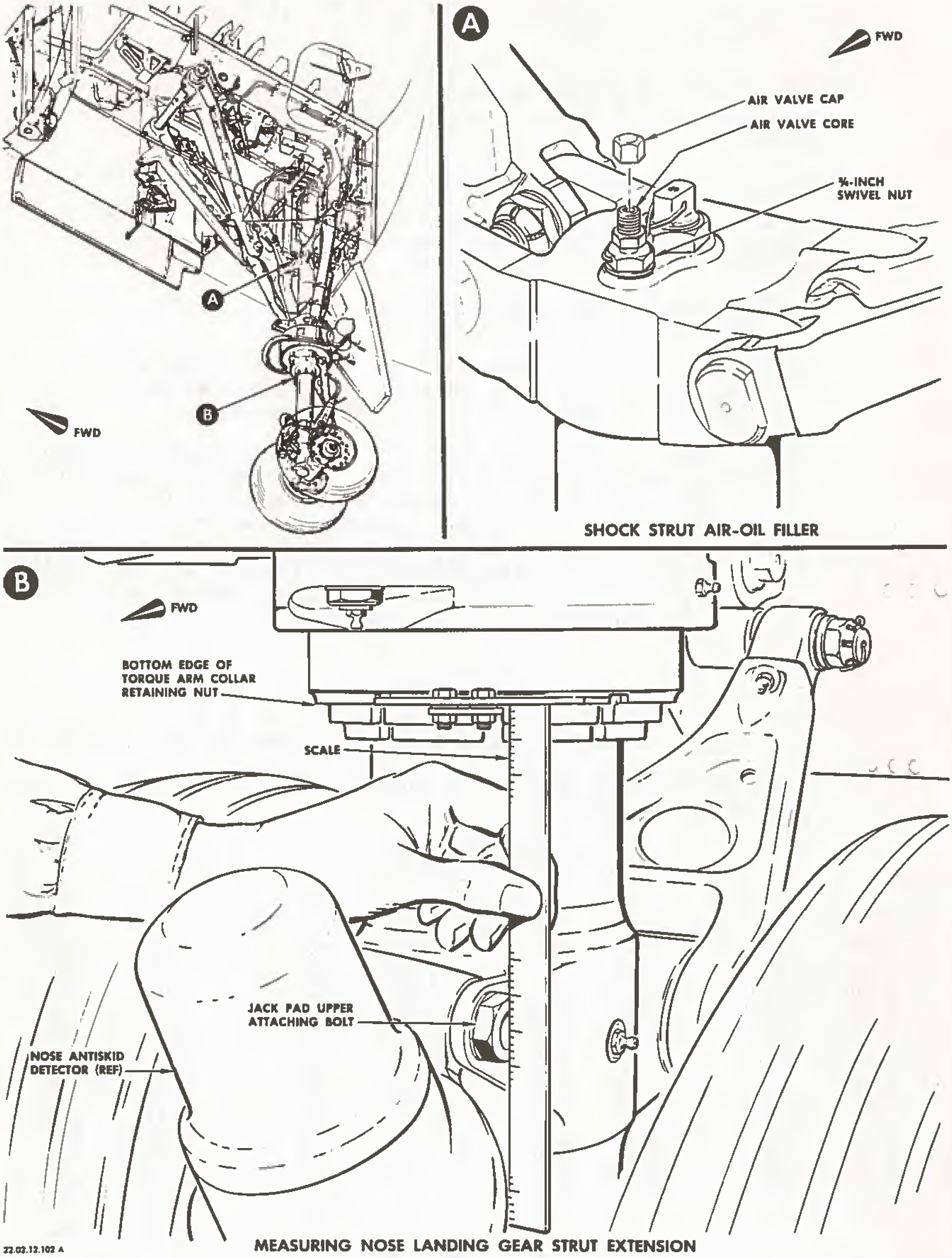
Servicing Nose Landing Gear and
Liquid Spring
Figure 201A



Servicing Nose Landing Gear
Figure 202

(6) Lubricate 0.50 inch diameter threads on air valve body with Parker Sealube, or equivalent.

(7) Install air valve assembly in port, torque valve body to a value of 100 to 110 inch-pounds, and safety-wire valve; tighten and then loosen hex swivel nut one-quarter turn maximum in counterclockwise direction.

(8) Connect source of dry compressed air or nitrogen to air valve.

(9) Inflate shock struts until proper distance between measuring points is obtained as follows (refer to Table I for correct distance between measuring points):

(a) Main landing gear - Measure distance between centers of torque arm end bolts.

(b) Nose landing gear - Measure distance between center of jack pad upper attaching bolt head and lower edge of torque arm collar retaining nut (see Figure 201).

NOTE: Table I lists the correct distance to be obtained between the measuring points at various strut inflation pressures. The strut inflation pressures will vary with the gross weight of the airplane. Airplane landing gear struts may be inflated while airplane is on jacks (no weight on struts). Inflate nose landing gear strut to 156 psig and main landing gear struts to 420 psig at ambient temperature of 70 (±15) degrees F (21 (±8) degrees C).

TABLE I

LANDING GEAR STRUT INFLATION TABLE

A = Distance between measuring points in inches (+0.00, -0.125).

B = Strut inflation pressure in psig at 70 (±15) degrees F (21 (±8) degrees C).

NOSE LANDING GEAR

A	B	A	B	A	B	A	B
3.00	1127	4.50	655	6.00	459	7.50	352
3.12	1080	4.62	634	6.12	448	7.62	346
3.25	1033	4.75	614	6.25	437	7.75	339
3.37	987	4.87	593	6.37	427	7.87	332
3.5	947	5.00	575	6.50	417	8.00	327
3.62	897	5.12	558	6.62	408	8.12	321
3.75	852	5.25	542	6.75	399	8.25	316
3.87	806	5.37	526	6.87	390	8.37	310
4.0	762	5.50	511	7.00	382	8.50	304
4.12	731	5.62	497	7.12	375	8.62	299
4.25	706	5.75	484	7.25	367	8.75	294
4.37	679	5.87	471	7.37	359	8.87	289
						9.00	284

TABLE I (CONT)

MAIN LANDING GEAR

A	B	A	B	A	B	A	B
7.00	1823	8.62	1329	10.25	1042	11.87	859
7.12	1771	8.75	1302	10.37	1026	12.00	847
7.25	1723	8.87	1277	10.50	1010	12.12	836
7.37	1678	9.00	1251	10.62	994	12.25	825
7.50	1637	9.12	1228	10.75	978	12.37	814
7.62	1596	9.25	1203	10.87	964	12.50	803
7.75	1559	9.37	1180	11.00	949	12.62	792
7.87	1521	9.50	1157	11.12	935	12.75	782
8.00	1484	9.62	1137	11.25	921	12.87	771
8.12	1452	9.75	1117	11.37	908	13.00	763
8.25	1419	9.87	1097	11.50	895	13.12	754
8.37	1388	10.00	1078	11.62	882	13.25	745
8.50	1357	10.12	1059	11.75	871	13.37	736
						13.50	727

NOTE: Shock strut extension should be checked after the airplane has been rolled forward and backward several feet to overcome packing friction. Overinflation can occur, causing subsequent hard landings, takeoffs and taxiing.

(10) Close (turn clockwise) hex swivel nut after proper strut inflation is obtained; torque swivel nut to a value of 50 to 70 inch-pounds.

(11) Shut off and remove source of dry compressed air or nitrogen.

(12) Replace air valve cap; torque cap to a value of 15 to 25 inch-pounds.

2. Servicing Main Landing Gear Truck Positioners (see Figure 201)

A. General.

The truck positioners should be checked for proper air pressure prior to each flight. To check truck positioner pressure, depress gage stem and release. Minimum pressure (1370 psig) is indicated when the milled step of the gage plunger is outside the gage housing. If the milled step is not outside the housing, charge truck positioner to 1700 (±25) psig. To properly service the positioner, the landing gear wheels must be in a position level with the ground.

B. Equipment required - Source of dry compressed air or nitrogen equipped with pressure gage to read truck positioner pressure.

C. Charge Truck Positioner. (Charging unit gage indicates pressure below 1675 psig.)

WARNING: DO NOT ATTEMPT TO REGULATE TRUCK POSITIONER AIR PRESSURE BY ADJUSTING AIR GAGE CAP. AIR GAGE IS CALIBRATED FOR 1370 PSIG. IF INSPECTION SEAL IS BROKEN OR TAMPERED WITH, UNIT MUST BE REMOVED AND RECALIBRATED.

(1) Remove cap from truck positioner air filler valve.

(2) Connect source of dry compressed air or nitrogen to air valve stem.

(3) Loosen (turn counterclockwise) hex swivel nut (do not turn valve body) on air filler valve one-quarter turn maximum. Charge unit with dry air or nitrogen until charging unit gage indicates pressure of 1700 (±25) psig.

(4) Tighten (turn clockwise) hex swivel nut and torque to a value of 50 to 70 inch-pounds.

(5) Remove source of dry compressed air or nitrogen.

(6) Replace air valve cap; torque cap to a value of 15 to 25 inch-pounds.

D. Reduce Truck Positioner Air Pressure. (Charging unit gage indicates pressure above 1725 psig.)

WARNING: DO NOT LOOSEN OR REMOVE AIR VALVE BODY, DRAIN PLUG OR AIR GAGE ASSEMBLY TO RELEASE AIR PRESSURE FROM TRUCK POSITIONER. INTERNAL PRESSURE MAY BLOW OUT ANY ONE OF THESE ITEMS CAUSING SERIOUS BODILY INJURY OR FATALITY TO SERVICING PERSONNEL.

(1) Remove cap from truck positioner air filler valve.

(2) Loosen hex swivel nut (not valve body) one-quarter turn maximum; allow air to escape until milled flat on gage stem is flush with housing. Recharge truck positioner to 1700 (±25) psig per step 2.C. Tighten hex swivel nut and torque to a value of 50-70 inch-pounds.

(3) Replace air filler valve cap; torque cap to a value of 15 to 25 inch-pounds.

E. Add Fluid to Truck Positioner.

(1) Perform steps D.(1) and (2) except allow all air pressure to escape, and do not tighten hex swivel nut; observe WARNING note preceding step D.(1).

(2) Cut safety wire and remove entire air charging valve assembly from truck positioner.

(3) Cut safety wire and remove drain plug from side of truck positioner.

(4) Add clean hydraulic fluid, Specification MIL-H-5606, through air valve port until fluid overflows from drain port on side of positioner; allow sufficient time for oil to settle in truck positioner to permit excess fluid to drain.

(5) Install drain plug and secure with safety wire.

TEMPORARY REVISION NO. 12-43.

(4) Bleed Air from liquid spring as follows:

(a) Cut safety wire from liquid spring charging gun adapter.

(b) Turn liquid spring charging gun adapter counterclockwise to allow air to escape from liquid spring.

(c) Pump charging gun handle until hydraulic fluid from liquid spring is free of air.

(d) Tighten liquid spring charging gun adapter and safety.

(5) Pump charging gun handle until dial on liquid spring temperature-pressure gage corresponds to existing ambient temperature (±20 degrees F) determined in step (1).

CAUTION: DO NOT ATTEMPT TO REMOVE CHARGING GUN FROM LIQUID SPRING UNTIL ALL PRESSURE IN GUN IS RELIEVED.

(6) Slowly turn bleeder valve on charging gun until bleeder valve unseats and vents pressure.

(7) When all pressure is relieved from charging gun, unscrew gun from charging valve on liquid spring.

(8) Replace and tighten cap on liquid spring charging valve.

TEMPORARY REVISION NO. 12-43.

Insert facing 12-5-0, Page 207, dated July 9/62.

The instructions in this temporary revision are applicable to airplanes incorporating a nose landing gear liquid spring.

Retain this temporary revision in your manual until all applicable airplanes have been modified per Service Bulletin No. 32-68.

3. Servicing Nose Landing Gear Liquid Spring (see Figure 201A)

A. General.

The nose landing gear liquid spring is charged with hydraulic fluid, specification MIL-H-5606 under high pressure from a special charging gun. The unit should be serviced when the dial temperature decreases more than 60 degrees F (33 degrees C) below ambient temperature, or below 0 degrees F (-18 degrees C).

B. Equipment Required.

(1) Charging gun (Cleveland Pneumatic P/N 9365 CF).

(2) Reliable thermometer graduated in degrees Fahrenheit.

C. Charge Liquid Spring.

(1) Determine existing ambient temperature in nose wheel well area.

NOTE: If airplane has been subjected to extreme temperature conditions prior to servicing, allow nose landing gear temperature to stabilize at ambient ± 20 degrees F (± 11 degrees C).

(2) Unscrew cap from liquid spring charging valve and screw charging gun to threads on valve.

NOTE: Position charging gun aft of nose landing gear drag brace trunnion with aft end of gun inboard and charging gun handle on lower side of gun.

(3) Bleed air from charging gun through bleed valve on gun. Turn bleed valve to open and pump gun handle until hydraulic fluid from bleed valve is free of air. Close bleed valve.

(6) Install air valve assembly in port on truck positioner; torque valve assembly body nut to a value of 100 to 110 inch-pounds and secure with safety wire.

(7) Charge truck positioner with dry compressed air or nitrogen as outlined in Paragraph C.

3. Servicing Nose Landing Gear Liquid Spring (see Figure 202)

Deleted.

4. Servicing Landing Gear Accumulators (see Figure 203)

A. General.

The landing gear accumulators (two) are located immediately inside and aft of the hydraulic compartment access door. Each accumulator is charged separately with dry compressed air or nitrogen through individual filler valves mounted just above the accumulators.

B. Equipment Required. Source of dry compressed air or nitrogen.

C. Charge Landing Gear Accumulator(s).

(1) Relieve No. 2 hydraulic system pressure (refer to 12-4-0, Relieving Hydraulic System Pressure).

WARNING: IN THE FOLLOWING STEPS, WHEN REMOVING VALVE CAP OR OPENING VALVE, HOLD VALVE BODY FIRMLY WITH WRENCH. A LOOSENED VALVE ASSEMBLY COULD BE BLOWN OUT BY INTERNAL PRESSURE CAUSING SERIOUS INJURY OR FATALITY TO PERSONNEL.

(2) Remove cap from filler valve.

(3) Connect source of dry compressed air or nitrogen to filler valve; ascertain that connection is secure.

(4) Open filler valve by turning hex swivel nut counterclockwise.

(5) Open valve on external source of compressed air or nitrogen and charge accumulator to 900 (±50) psig.

NOTE: If servicing brake accumulator (second accumulator aft of hydraulic compartment door), actuate brakes to relieve pressure and recheck accumulator air charge.

(6) Close filler valve by turning hex swivel nut clockwise; torque swivel nut to a value of 50 to 70 inch-pounds.

(7) Close valve on external air or nitrogen supply.

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B. Equipment Required. Source of dry compressed air or nitrogen.

C. Charge Landing Gear Accumulator(s).

(1) Relieve No. 2 hydraulic system pressure (refer to 12-4-0, Relieving Hydraulic System Pressure).

<u>WARNING:</u> IN THE FOLLOWING STEPS, WHEN REMOVING VALVE CAP OR OPENING VALVE, HOLD VALVE BODY FIRMLY WITH WRENCH. A LOOSENED VALVE ASSEMBLY COULD BE BLOWN OUT BY INTERNAL PRESSURE CAUSING SERIOUS INJURY OR FATALITY TO PERSONNEL.

(2) Remove cap from filler valve.

(3) Connect source of dry compressed air or nitrogen to filler valve; ascertain that connection is secure.

(4) Open filler valve by turning hex swivel nut counterclockwise.

(5) Open valve on external source of compressed air or nitrogen and charge accumulator to 900 (±50) psig.

(6) Close filler valve by turning hex swivel nut clockwise; torque swivel nut to a value of 50 to 70 inch-pounds.

(7) Close valve on external air or nitrogen supply.

<u>WARNING:</u> WHEN REMOVING SOURCE OF AIR OR NITROGEN IN STEP (8) FOLLOWING, HOLD VALVE BODY WITH WRENCH TO PREVENT VALVE FROM TURNING.

(8) Disconnect external source of air or nitrogen from filler valve.

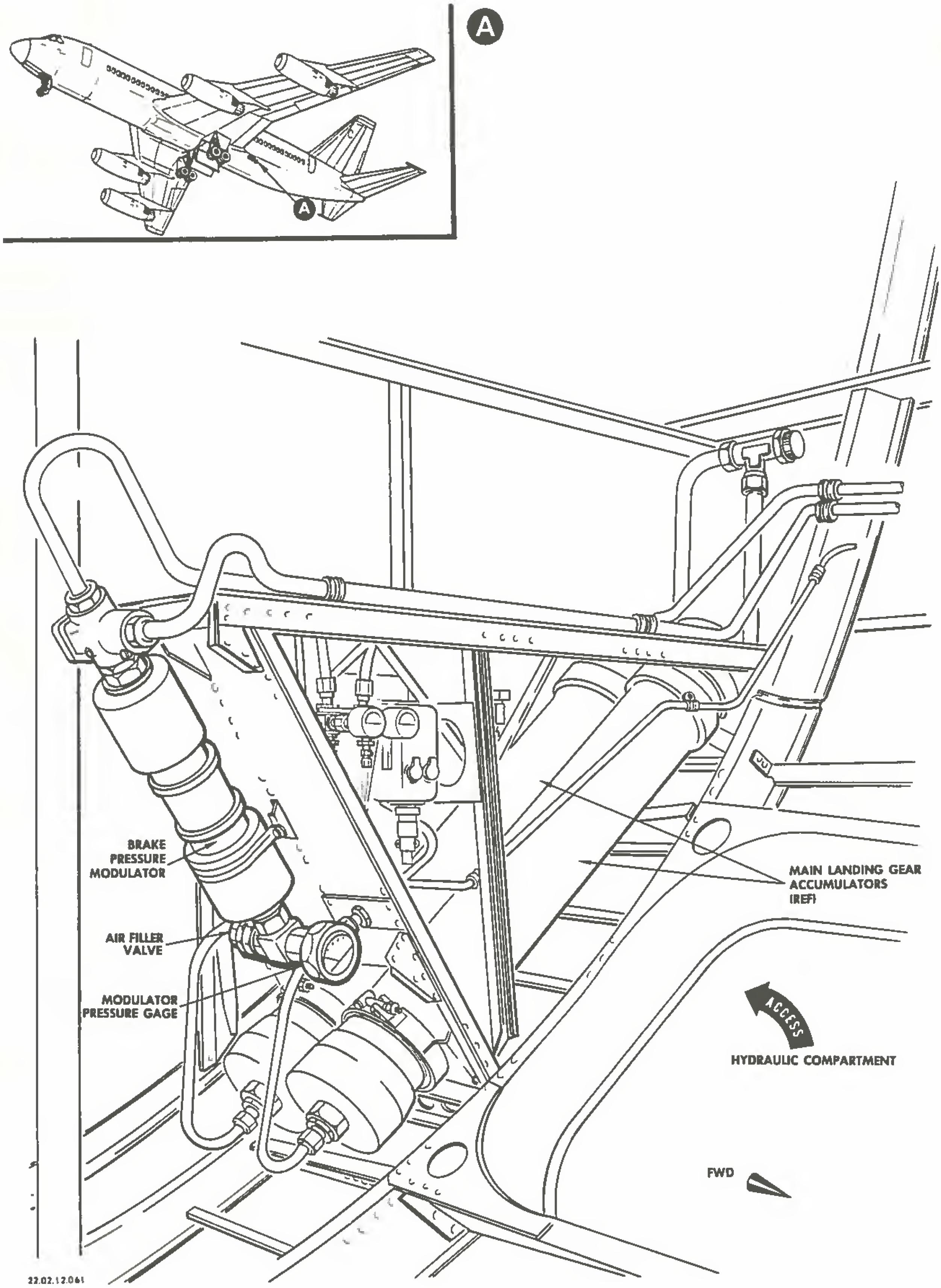
5. <u>Servicing Brake Pressure Modulators (see Figures 204 and 205)</u>

A. General.

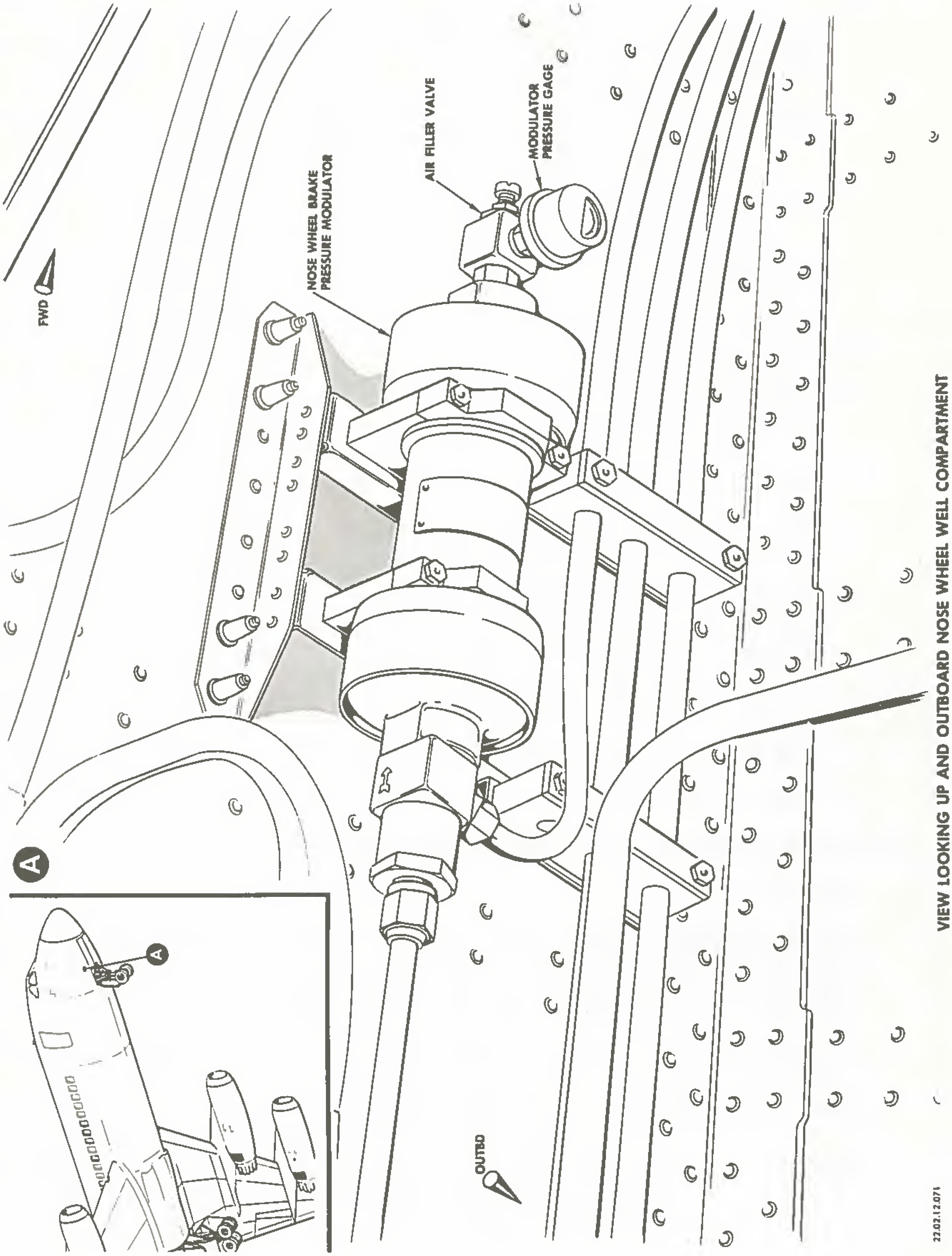
The main wheel brake pressure modulator is located immediately inside and aft of the hydraulic compartment access door. The nose wheel brake pressure modulator is located on the left side of the nose wheel well ceiling, just aft of the brake metering valve. The modulators are charged with dry filtered air or nitrogen through the filler valves located at the bottom of the modulators.

B. Equipment Required - Source of dry filtered air or nitrogen.

C. Charge Brake Pressure Modulators.



Servicing Main Wheel Brake Pressure Modulator
Figure 204



Servicing Nose Wheel Brake Pressure Modulator
Figure 205

(1) Relieve No. 1 or No. 2 hydraulic system pressure to service main or nose wheel brake pressure modulator respectively. (Refer to Relieving Hydraulic System Pressure.)

WARNING: IN THE FOLLOWING STEPS, WHEN REMOVING VALVE CAP OR OPENING VALVE, HOLD VALVE BODY FIRMLY WITH WRENCH. A LOOSENED VALVE ASSEMBLY COULD BE BLOWN OUT BY INTERNAL PRESSURE CAUSING SERIOUS INJURY OR FATALITY TO PERSONNEL.

(2) Remove cap from filler valve.

(3) Connect source of dry filtered air or nitrogen to filler valve; ascertain connection is secure.

(4) Open filler valve by turning hex swivel nut counterclockwise.

(5) Open valve on external air or nitrogen supply and charge modulators as follows:

(a) Main Wheel Brake Pressure Modulator - 300 (±25) psig.

(b) Nose Wheel Brake Pressure Modulator - 200 (±15) psig.

(6) Close filler valve by turning swivel nut clockwise; torque swivel nut to a value of 50 to 70 inch-pounds.

(7) Close valve on external air or nitrogen supply.

WARNING: WHEN REMOVING SOURCE OF AIR OR NITROGEN IN STEP (8) FOLLOWING, HOLD VALVE BODY FIRMLY WITH WRENCH TO PREVENT VALVE FROM TURNING.

(8) Disconnect external source of air or nitrogen.

(9) Replace filler valve cap.

6. Servicing Brake Emergency Air System (see Figure 206)

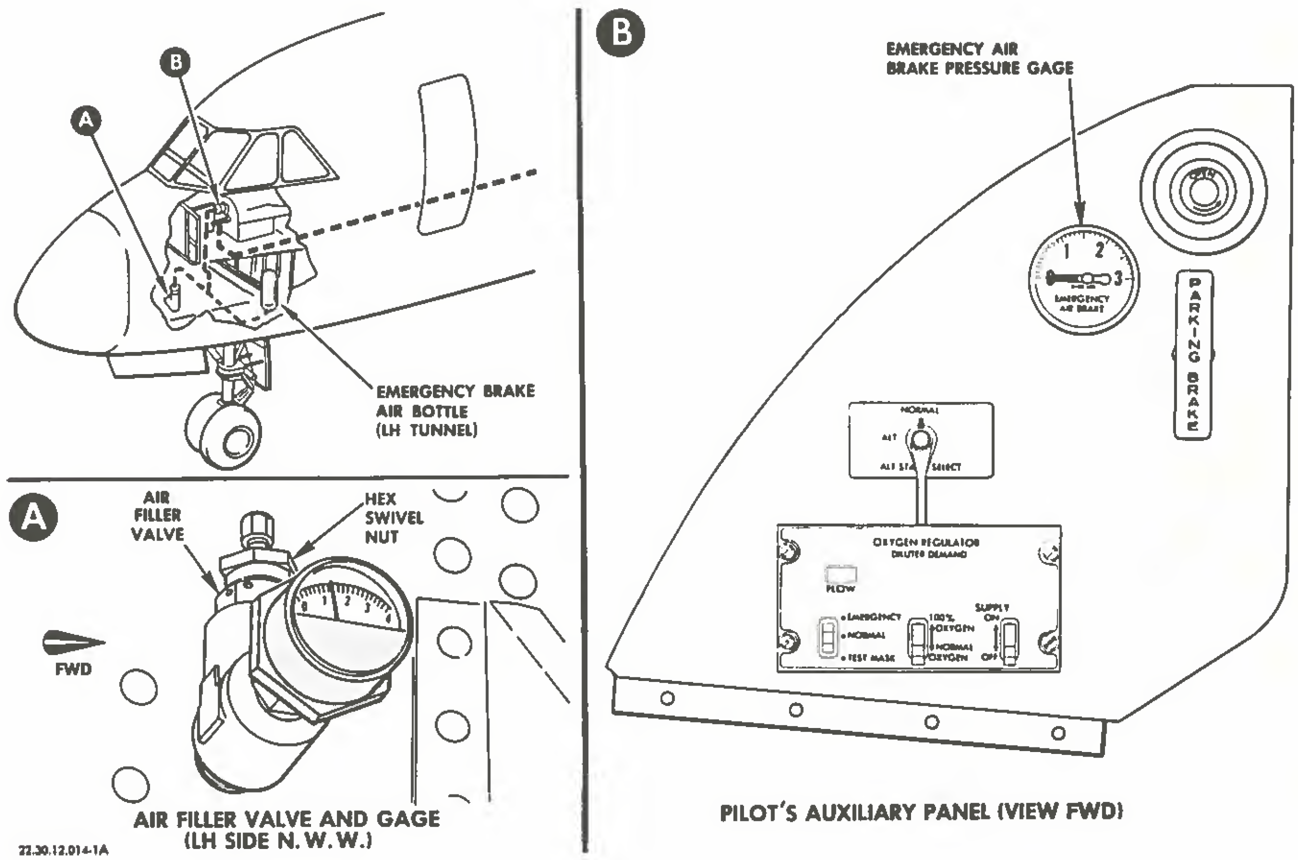
A. General.

The brake emergency air storage flask is located in the forward left side of the fuselage in the electrical equipment tunnel. The flask is charged with dry compressed air or nitrogen through the filler valve located at the left-center side of the nose wheel well.

B. Equipment Required. Source of dry compressed air or nitrogen.

C. Charge Brake Emergency Air Storage Flask.

WARNING: IN THE FOLLOWING STEPS, WHEN REMOVING VALVE CAP OR OPENING VALVE, HOLD VALVE BODY NUT FIRMLY WITH WRENCH. A LOOSENED VALVE ASSEMBLY COULD BE BLOWN OUT BY INTERNAL PRESSURES CAUSING SERIOUS INJURY OR FATALITY TO PERSONNEL.



Servicing Brake Emergency Air Supply
Figure 206

(1) Remove cap from air filler valve.

(2) Connect source of dry compressed air or nitrogen to filler valve; ascertain that connection is secure.

(3) Open filler valve by turning hex swivel nut counterclockwise.

(4) Open valve on external air or nitrogen supply and charge air flask to 3000 (±100) psig.

(5) Close filler valve by turning swivel nut clockwise; torque swivel nut to a value of 50 to 70 inch-pounds.

(6) Close valve on external air or nitrogen source.

WARNING: WHEN REMOVING SOURCE OF AIR OR NITROGEN IN STEP (7) FOLLOWING, HOLD VALVE BODY FIRMLY WITH WRENCH TO PREVENT VALVE FROM TURNING.

(7) Disconnect external source of air or nitrogen from filler valve.

(8) Replace valve cap.

7. Servicing Main and Nose Landing Gear Tires

A. General.

Inflation pressures of the landing gear tires is governed by the gross weight of the airplane. See Charts I and II following for correct inflation pressures for the nose and main gear tires respectively.

CHART NO. I
NOSE LANDING GEAR TIRE INFLATION CHART

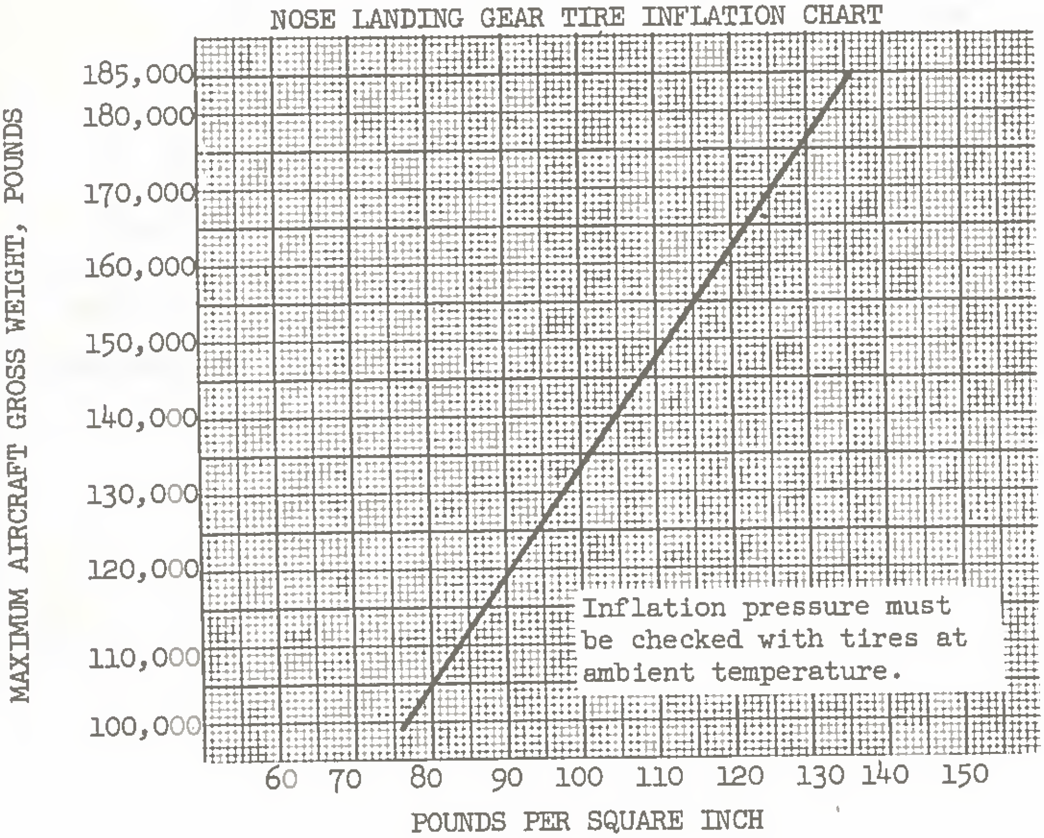
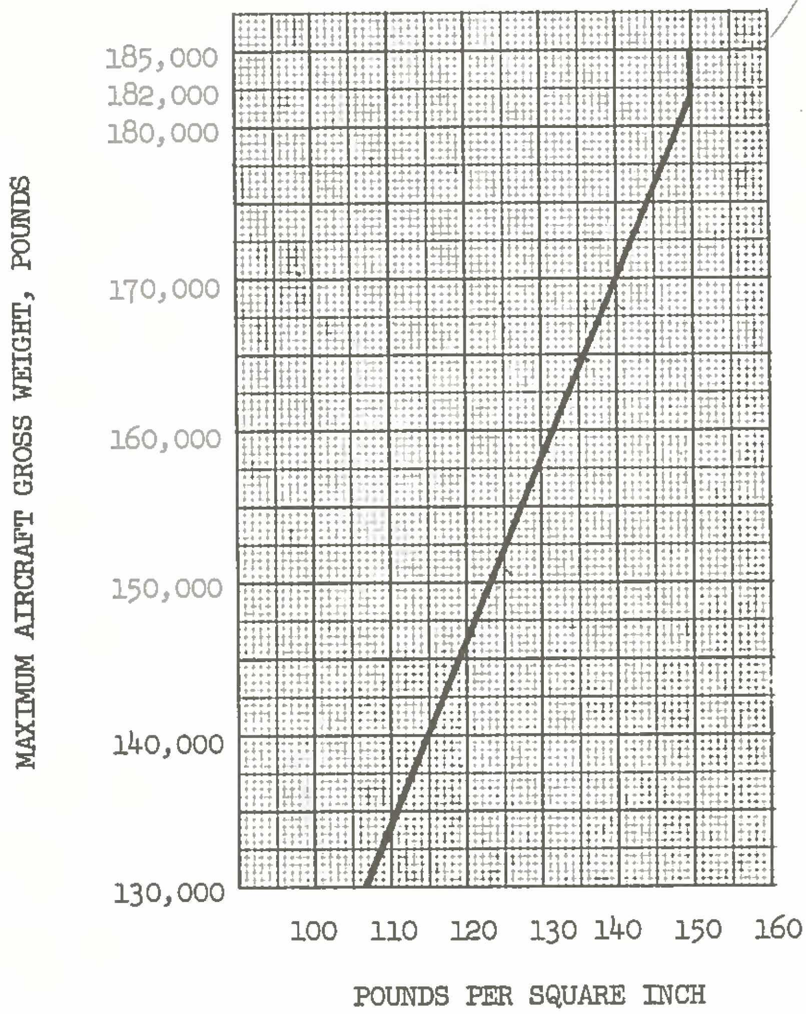


CHART II

MAIN LANDING GEAR TIRE INFLATION CHART



Tire load limited above 182,000 pounds gross weight by airplane loading.

Inflation pressures must be checked with tires at ambient temperature.

Maximum rated pressure for main landing gear tires is 150 psi.

TEMPORARY REVISION NO. 12-47.

This temporary revision supersedes Temporary Revision No. 12-44

Insert facing 12-5-0, Page 217, dated May 22/63 (or subsequent).

The instructions on the noted facing page are to be used for all applicable airplanes except as follows: for airplanes not modified per Service Bulletin No. 32-48, substitute the following instructions where indicated.

Retain this temporary revision in your manual until all applicable airplanes have been modified per noted service bulletin.

Delete text in note at beginning of Paragraph 8.B. and replace with the following:

NOTE: If servicing NLG lockout cylinder, the ANTI-SKID CONT NLG circuit breaker must be closed, the 28-volt dc essential bus energized, and test switch on NLG antiskid control box depressed.

8. Servicing Brake Lockout Cylinders (see Figure 207)

A. Equipment Required - None.

B. Service Brake Lockout Cylinders.

NOTE: If servicing NLG lockout cylinder, the ANTI-SKID CONT NLG circuit breaker must be closed, the 28-volt dc essential bus energized, and the NOSE WHEEL BRAKES switch on the pilots' console must be held in the momentary on position.

(1) Pressurize hydraulic systems (refer to Chapter 29, HYDRAULIC POWER).

(2) Depress brake pedals and check that all brake lockout cylinder indicators are in the green operating range; release brakes.

NOTE: The NLG brake lockout cylinder is located on the NLG left-hand side brace; the MLG brake lockout cylinders are located on the forward side of the MLG beam in each main wheel well.

(3) If any lockout cylinder indicator is not in the green range, that cylinder must be filled as follows:

(a) Loosen bleed-screw at top of brake lockout cylinder indicator.

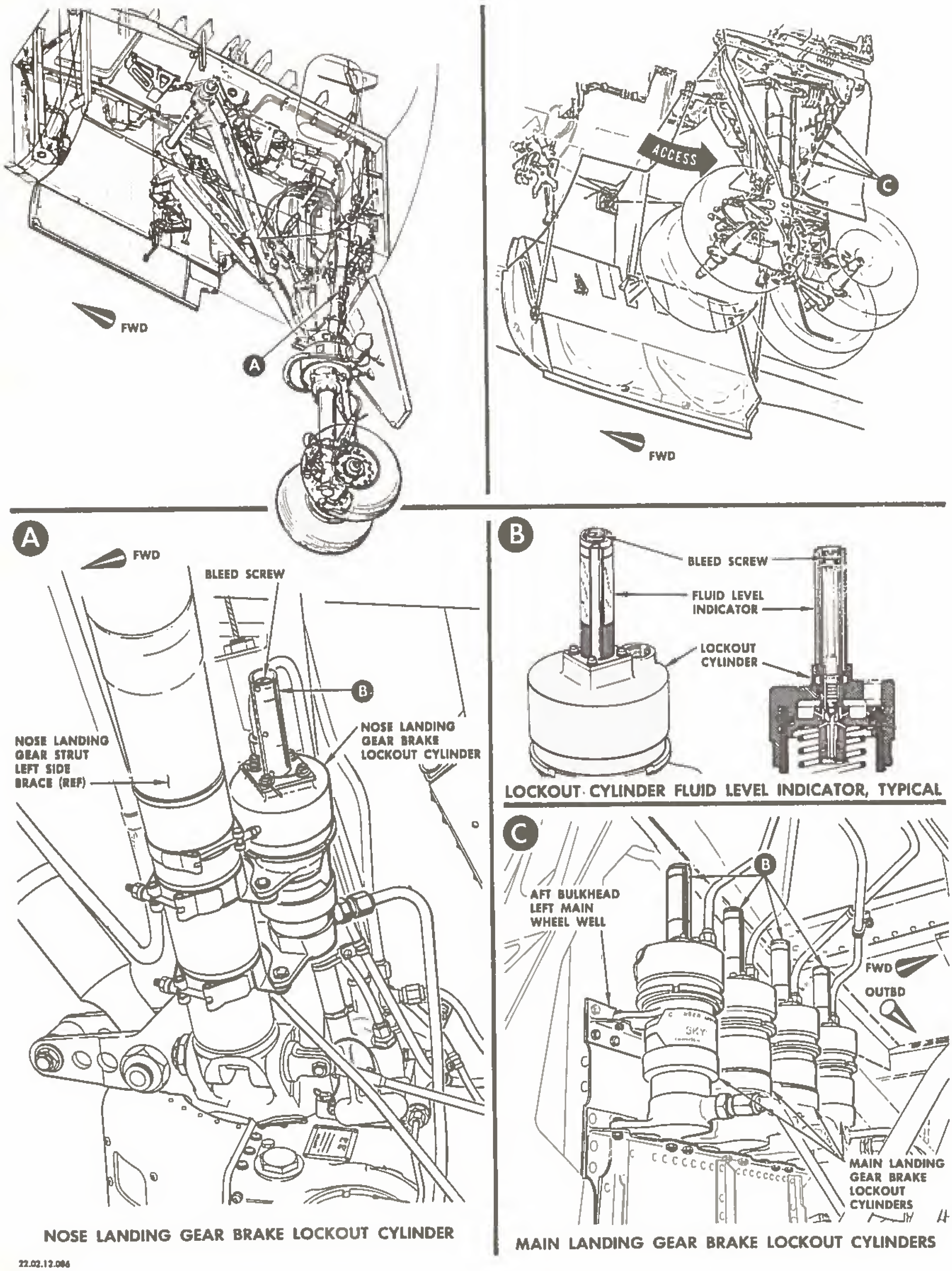
(b) Pump brake pedals several times.

(c) Release brakes, wait one minute and then retighten bleed screw.

NOTE: Waiting one minute before tightening the lockout cylinder bleed screw allows excess hydraulic fluid trapped in the lower chamber of the lockout cylinder to escape.

(d) Depress brake pedals and again check that lockout cylinder indicator is in the green range; release brakes.

(4) Reduce hydraulic system pressure to 0 psig and check hydraulic reservoir fluid quantity (refer to Section 12-4-0, Hydraulic System Servicing).



Servicing Main and Nose Landing Gear
Lockout Cylinders
Figure 207

OXYGEN SYSTEM SERVICING

1. Servicing Oxygen System (see Figure 201)

A. Servicing the oxygen system consists of replacing the oxygen supply bottles when their contents have been depleted below the minimum requirements.

B. Equipment Required - None.

C. Service Flight Crew Oxygen System.

(1) Observe flight crew (forward) oxygen bottle pressure gage; replace oxygen bottle if gage indicates less than:

(a) 670 psig at 130 degrees F (54 degrees C).

(b) 645 psig at 110 degrees F (43 degrees C).

(c) 620 psig at 90 degrees F (32 degrees C).

(d) 600 psig at 70 degrees F (21 degrees C).

(e) 580 psig at 50 degrees F (10 degrees C).

(f) 555 psig at 30 degrees F (-1 degree C).

(g) 535 psig at 10 degrees F (-12 degrees C).

(h) 510 psig at -10 degrees F (-23 degrees C).

(i) 485 psig at -30 degrees F (-34 degrees C).

NOTE: Refer to Chapter 35, OXYGEN for Removal/Installation of oxygen bottles.

D. Service Passenger Oxygen System.

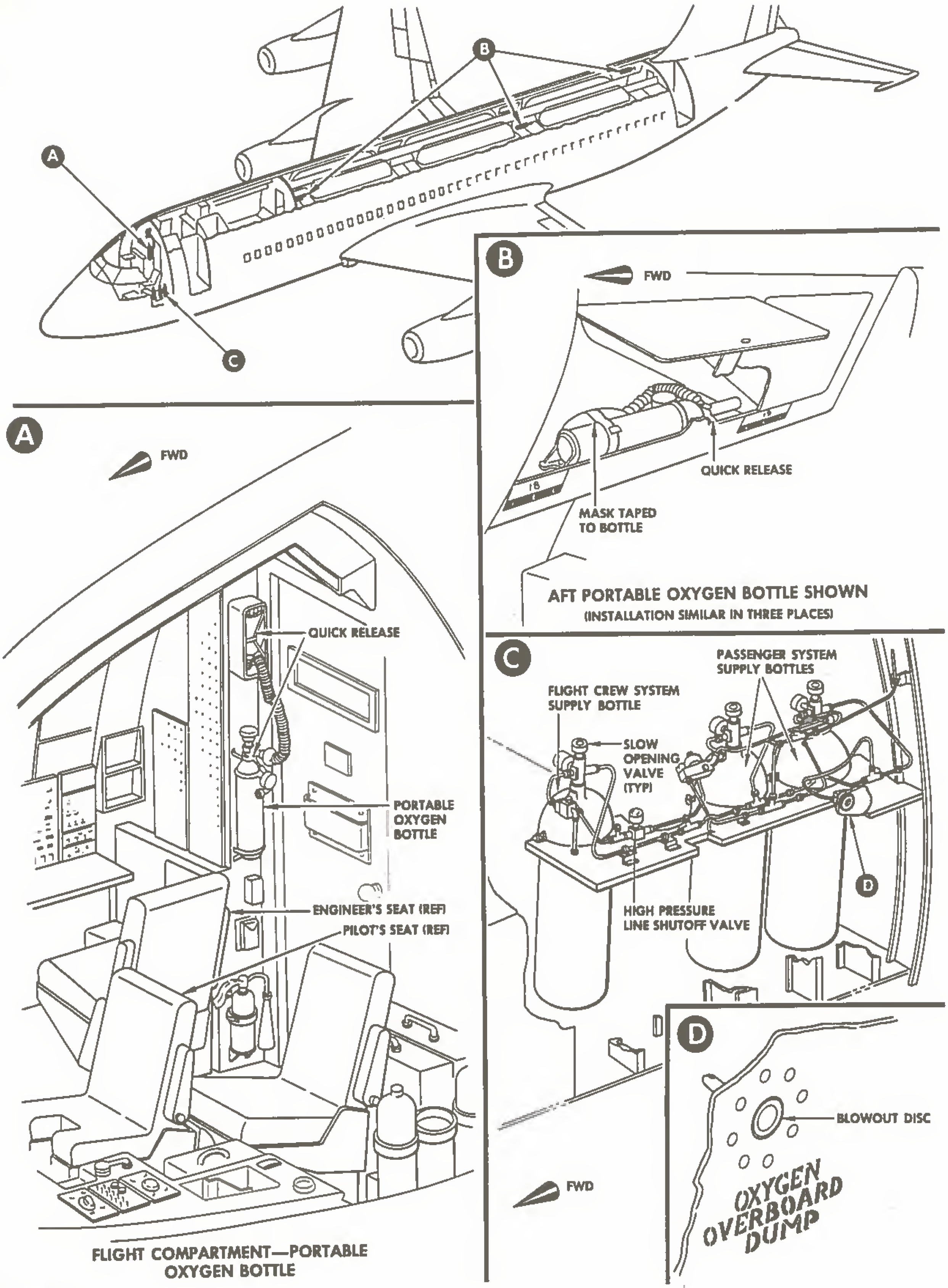
(1) Ascertain that manual override switches on automatic-opening and continuous-flow regulators are in OFF position.

(2) Observe passenger (two aft) oxygen bottle pressure gage; replace oxygen bottle(s) if gage(s) indicates less than:

(a) 1615 psig at 130 degrees F (54 degrees C).

(b) 1560 psig at 110 degrees F (43 degrees C).

(c) 1505 psig at 90 degrees F (32 degrees C).



Servicing Oxygen System
Figure 201

(d) 1450 psig at 70 degrees F (21 degrees C).

(e) 1395 psig at 50 degrees F (10 degrees C).

(f) 1340 psig at 30 degrees F (-1 degree C).

(g) 1285 psig at 10 degrees F (-12 degrees C).

(h) 1230 psig at -10 degrees F (-23 degrees C).

(i) 1175 psig at -30 degrees F (-34 degrees C).

<u>NOTE</u>: Refer to Chapter 35, OXYGEN for Removal/Installation of oxygen bottles.

E. Service Flight Crew and Passenger Portable Oxygen Bottles.

(1) Replace portable oxygen bottle(s) if constant-reading pressure gage(s) indicate less than 1850 (±50) psig.

FRESH WATER SYSTEM SERVICING

1. Fresh Water System Servicing (see Figure 201)

A. General.

The fresh water system is serviced at the service panel located just forward of the right wing, on the lower side of the fuselage at station 611.

B. Equipment Required.

(1) Potable water service cart containing hose equipped with Roylyn 1002-12C adapter fitting.

(2) Suitable container to collect water at faucets, filters and coffee makers.

WARNING: WATER CART AND WATER MUST MEET U.S. DEPARTMENT OF HEALTH STANDARDS.

C. Drain Fresh Water Tank.

(1) Open and attach warning sign to PASS WATER CONT & WARN circuit breaker, on main circuit breaker panel.

(2) Open fresh water system service panel access door.

(3) Unscrew cap on PRESSURE RELEASE and FILL handle and release air pressure by moving handle in direction indicated by arrow on handle.

(4) Remove safety pin from DRAIN handle and move handle in direction indicated by arrow to drain water.

NOTE: Allow water to drain completely from tank.

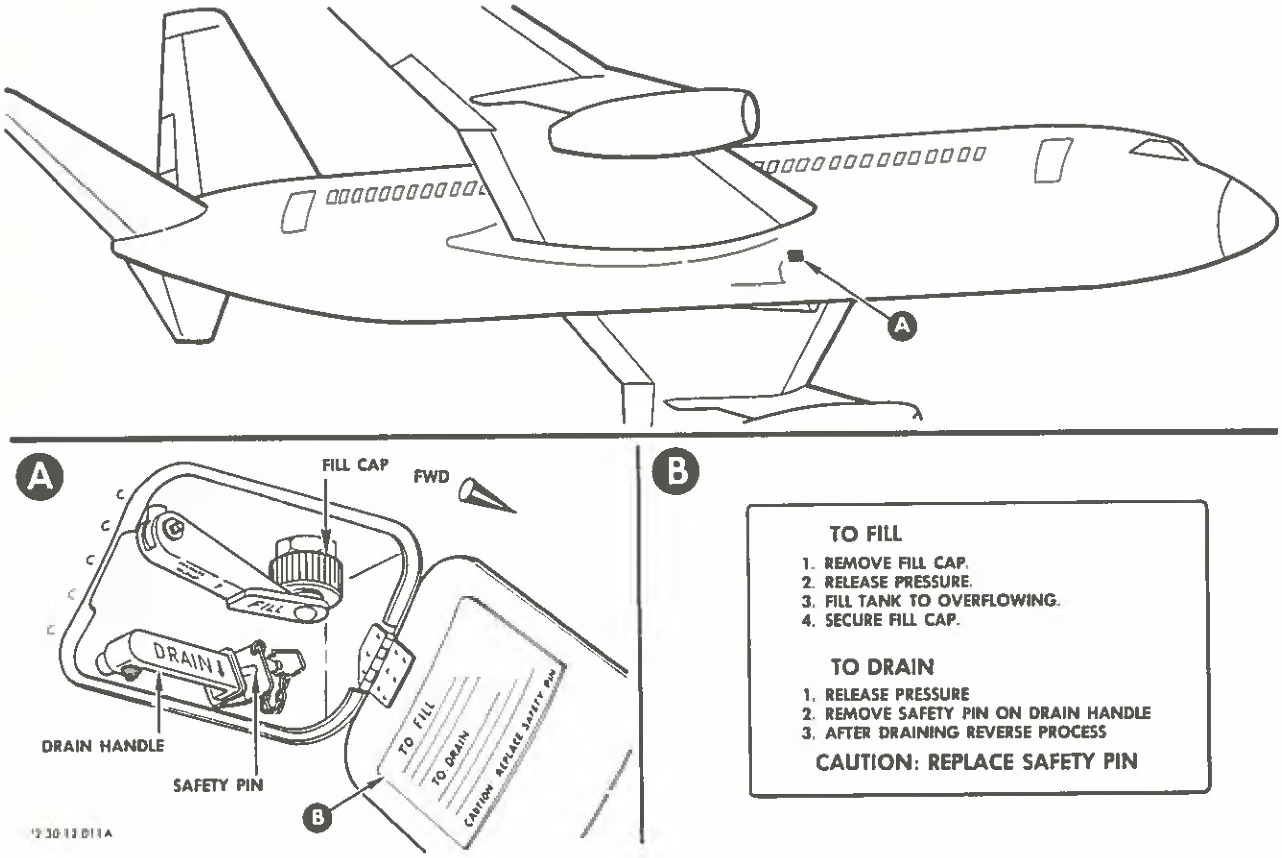
(5) Place DRAIN handle in neutral position and replace safety pin.

(6) Place PRESSURE RELEASE and FILL handle in neutral position and secure (screw tight) cap.

(7) Remove warning sign and close circuit breaker.

D. Drain Fresh Water System.

(1) Drain fresh water tank (Refer to paragraph 4).



Fresh Water System Service Panel
Figure 201

(2) Open and attach warning signs to HOT WATER HTR ØA, ØB and ØC circuit breakers, on main circuit breaker panel.

(3) Pressurize fresh water system (refer to Chapter 38, WATER/WASTE).

(4) Open faucets in forward and aft lavatories and allow air pressure to blow water out of lines.

(5) Open drain valves on forward and aft lavatory water heaters and allow air pressure to blow water out of lines.

(6) Open drain valve on each water filter (in lower portion of buffets) and allow air pressure to blow water out of lines.

(7) Close drain valves on water filters and heaters.

(8) Open and attach warning sign to PASS WATER CONT & WARN circuit breaker, on main circuit breaker panel.

(9) Unscrew cap on PRESSURE RELEASE and FILL handle and release air pressure by moving handle in direction indicated by arrow.

(10) Place DRAIN handle in neutral position and replace safety pin.

(11) Place PRESSURE RELEASE and FILL handle in neutral position and secure (screw tight) cap.

(12) Remove warning signs and close circuit breakers.

E. Drain Fresh Water System - Cold Weather Operations.

NOTE: The fresh water system must be completely drained whenever the airplane is to be exposed to freezing temperatures for extended periods of time.

(1) Perform steps D. (1) through D. (6).

(2) Open the following valves until water flow stops completely:

(a) Forward and aft buffet hot and cold water faucets.

(b) Forward and aft buffet water filter drain valves.

(c) Forward buffet drinking fountains and coffee maker drain valves.

NOTE: If the water pressurization system is inoperative and/or water pressurization is not possible, follow step (2), holding faucets and drinking fountains open long enough to allow water to siphon down to the filter drain valves.

(3) Close water filter and coffee maker drain valves.

(4) Open and attach warning signs to PASS WATER CONT & WARN circuit breaker, on main circuit breaker panel.

(5) Unscrew cap on PRESSURE RELEASE and FILL handle and release air pressure by moving handle in direction indicated by arrow.

(6) Leave PRESSURE RELEASE and FILL handle and DRAIN handle in open position to prevent residual water collecting and freezing in lines.

(7) Remove water filter cartridges (refer to Chapter 25, EQUIPMENT/FURNISHINGS).

(8) Remove warning sign and close circuit breaker.

F. Fill Fresh Water Tank.

(1) Open fresh water system service panel access door.

(2) Unscrew cap on PRESSURE RELEASE and FILL handle and release air pressure by moving handle in direction indicated by arrow.

(3) Connect hose from potable water service cart to FILL connection on airplane.

(4) Fill water tank until water flows from overflow line.

<u>WARNING:</u> WATER USED MUST MEET U.S. DEPARTMENT OF HEALTH STANDARDS.

(5) Remove water hose from FILL connection: place PRESSURE RELEASE and FILL handle in neutral position and secure (screw tight) cap.

(6) Close service panel access door.

G. Fill Fresh Water System.

<u>NOTE:</u> If the fresh water system has been drained completely, it is necessary to first fill, then pressurize the water supply tank, and force water through the entire system to eliminate air trapped within the system lines.

(1) Perform steps F. (1) through F. (5).

(2) Close PASS WATER CONT & WARN circuit breaker on main circuit breaker panel.

(3) Pressurize water system (refer to Chapter 38, WATER/WASTE).

(4) Hold forward and aft lavatory faucets open until water flows from spigots.

(5) Hold forward and aft buffet hot and cold water faucets and forward buffet drinking water faucets open until water flows from each spigot.

(6) Re-fill fresh water tank per steps F. (2) through F. (6).

WASTE SYSTEM SERVICING

1. Waste System Servicing (see Figure 201)

A. General.

The forward lavatory is serviced at the service panel located just below the forward main entrance door at fuselage station 347. The two aft lavatories are serviced at one common service panel located at the bottom centerline (BL 0.0) of the fuselage at station 1331. Servicing instructions are placarded on the inner surface of each lavatory service panel access door.

B. Equipment Required.

(1) Suitable service cart equipped as follows:

(a) Waste tank with minimum capacity of 130 gallons.

(b) Minimum fresh water supply of 60 gallons.

(c) Water pump capable of pumping approximately 15 gpm.

(d) Drain hose equipped with Roylyn 2651-127D adapter fitting.

(e) Flush-charge hose equipped with Roylyn 1041-16C adapter fitting.

(2) Degerm solution.

C. Drain Waste Tanks.

(1) Open lavatory service panel access door(s).

NOTE: In step (2) following, prior to removing the waste drain outlet cap, open petcock in center of cap to check for presence of waste matter; close petcock when flow (if any) stops.

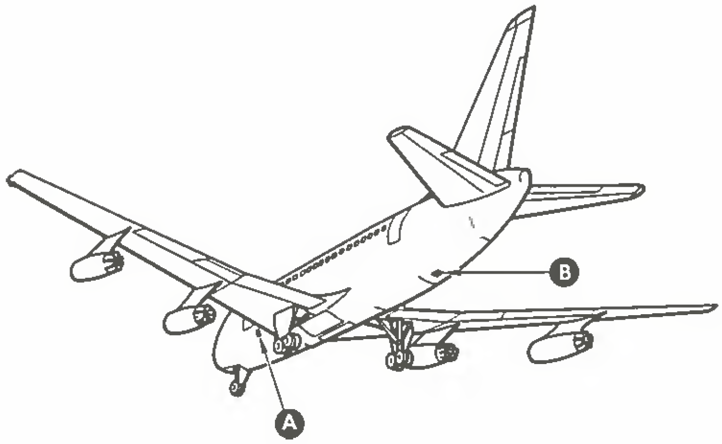
(2) Remove waste drain outlet cap and attach drain hose from service cart waste tank to outlet fitting.

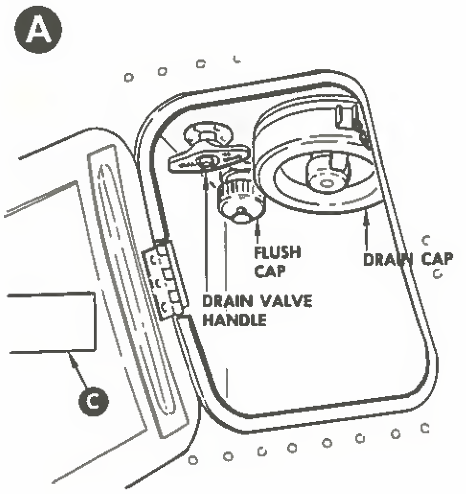
(3) Depress button in center of drain handle; pull handle all the way down before releasing button.

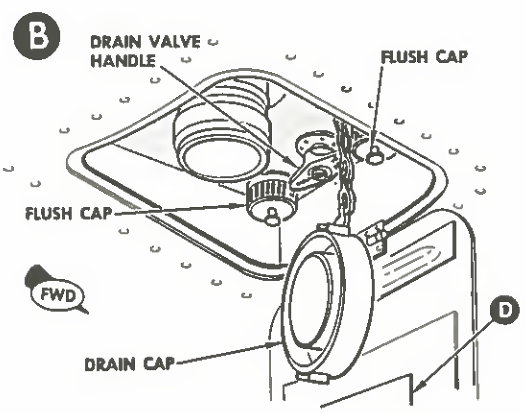
D. Flush Waste Tanks.

(1) Remove flush fitting cap and attach hose from service cart to fitting.

NOTE: It is necessary to flush both aft lavatories individually by use of the two flush fittings provided at the aft service panel.







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C

CAUTION: DO NOT PULL DRAIN HANDLE UNTIL DRAIN HOSE HAS BEEN CONNECTED.

1. REMOVE DRAIN AND FLUSH CAPS.
2. CONNECT DRAIN AND FLUSH HOSES.
3. OPEN DRAIN VALVE BY DEPRESSING BUTTON IN CENTER OF HANDLE AND PULL (PULL HANDLE ALL THE WAY DOWN BEFORE RELEASING BUTTON).
4. FLUSH TANK.
5. CLOSE DRAIN VALVE BY DEPRESSING BUTTON IN CENTER OF HANDLE AND PUSHING HANDLE ALL THE WAY UP.
6. DISCONNECT HOSES AND REPLACE DRAIN AND FLUSH CAPS.

D

CAUTION: DO NOT PULL DRAIN HANDLE UNTIL DRAIN HOSE HAS BEEN CONNECTED.

1. REMOVE DRAIN AND FLUSH CAPS.
2. CONNECT DRAIN HOSE.
3. OPEN DRAIN VALVE BY DEPRESSING BUTTON IN CENTER OF HANDLE AND PULL (PULL HANDLE ALL THE WAY DOWN BEFORE RELEASING BUTTON).
4. FLUSH TANKS BY CONNECTING WATER HOSE TO FIRST ONE INLET THEN THE OTHER.
5. CLOSE DRAIN VALVE BY DEPRESSING BUTTON IN CENTER OF HANDLE AND PUSHING HANDLE ALL THE WAY UP.
6. DISCONNECT HOSES AND REPLACE DRAIN AND FLUSH CAPS.

Waste System Service Panels
Figure 201

(2) Flush waste tank(s) with fresh water for a minimum of one minute (approximately 15 gallons).

NOTE: Allow flush water to drain completely from waste tanks.

(3) Depress button in center of drain handle and push handle all the way in.

(4) Remove service cart drain hose from drain outlet fitting: replace drain outlet cap.

E. Charge Waste Tanks.

(1) Charge (fill) waste tank(s) through flush fitting with approximately three gallons of fresh water.

(2) Add degerm solution to water in waste tank(s).

NOTE: Amount of degerm solution added to water depends on brand of degerm used. Follow degerm manufacturer's recommendations for mixture ratio.

(3) Remove service cart flush hose and replace flush fitting cap.

(4) Ascertain that drain handle, flush fitting cap and drain outlet cap are secure: close service panel access doors.

BATTERY SERVICING

1. Battery Servicing

A. General.

Servicing the battery consists essentially of checking the battery's state of charge and electrolyte level. The state of charge of the nickel-cadmium battery cannot be determined by the battery voltage or specific gravity of the electrolyte as in the case of conventional lead-acid type batteries. However, specific gravity readings, unlike the lead-acid battery, are normally not required as there is only a negligible change in the specific gravity of the electrolyte, with a change in the battery's state of charge. The battery is located forward of the pilots' instrument panel on the right side of the fuselage and is accessible through the nose wheel well door.

During servicing of the nickel-cadmium battery the following precautions should be observed:

(1) Service tools previously used on an acid-type battery should not be used on a nickel-cadmium battery. Bringing acid-bearing tools near the battery can neutralize the potassium hydroxide.

(2) Vent caps should not be removed for a long period of time, as exposure to air will contaminate the electrolyte with carbon dioxide.

(3) Use only distilled water when adjusting the electrolyte level.

WARNING: USE EXTREME CARE WHEN WORKING AROUND THE TOP OF CELLS. SEVERE SPARKING COULD RESULT IF UNINSULATED TOOLS ARE DROPPED ON THE CELL TERMINALS.

B. Equipment Required.

(1) Source of external ac electrical power.

(2) Battery cell filler plug wrench (Sonotone P/N X-16979).

(3) Clean hydrometer.

NOTE: Do not use hydrometer or other tools to service the nickel-cadmium battery which have previously been used on lead-acid type batteries.

C. Check Battery Charge.

(1) Connect and apply source of external ac electrical power (refer to Chapter 24, ELECTRICAL POWER).

(2) Place dc voltmeter selector switch (on flight engineer's dc power control panel) in BATT position; voltmeter shall indicate approximaterly 27.5 volts.

(3) Ascertain that pilots' ac essential bus selector switch (on pilots' overhead switch panel) is in EXT PWR position.

(4) Place battery control switch (on flight engineer's dc power control panel) in NORMAL position and check that:

(a) Battery CHARGER RELAY OPEN light extinguishes.

(b) Battery ammeter indicates from +1 to +10 amperes for short period of time, then returns to approximately 0, indicating battery charge is good.

NOTE: If ammeter indicates a continuous high amperage reading (over +10 amperes) the battery and/or a cell(s) is damaged and must be replaced (refer to Chapter 24, ELECTRICAL POWER, for procedure).

(5) Place battery control switch in OFF position and check that:

(a) Battery ammeter indicates 0.

(b) CHARGER RELAY OPEN light shall remain extinguished.

(6) Shut off external ac electrical power.

D. Check Electrolyte Level and Specific Gravity.

NOTE: When checking electrolyte level, first charge battery and then allow it to stand idle for three or four hours before determining liquid level.

WARNING: POTASSIUM HYDROXIDE IS HIGHLY CORROSIVE. IF ANY IS SPILLED ON HANDS, CLOTHING OR OTHER MATERIAL, FLOOD AREA IMMEDIATELY WITH COLD WATER, BORIC ACID SOLUTION, VINEGAR OR FRUIT JUICE. RUBBER GLOVES, APRONS AND FACE SHIELDS SHOULD BE WORN AT ALL TIMES WHEN HANDLING POTASSIUM HYDROXIDE. CONSULT PHYSICIAN IF SOLUTION COMES IN CONTACT WITH EYES.

(1) Using special wrench, remove battery cell filler plugs by turning plug counterclockwise 1/4 turn to unlocked position.

CAUTION: IN STEP (2) FOLLOWING, IF WATER IS NEEDED ADD IT SLOWLY WITH A DROPPER OR SYRINGE.

(2) Check that electrolyte level is at top of splash plate; if level is low, add pure distilled water only.

(3) Check specific gravity of electrolyte; specific gravity shall be between 1250 and 1300.

(4) If specific gravity is low, add potassium hydroxide, reagent grade, of specific gravity 1320.

(5) Replace battery cell filler plugs; turn plugs clockwise 1/4 turn to locked position.

E. Clean Battery.

NOTE: Cleaning nickel-cadmium batteries is normally not necessary except for an occasional dusting. If overcharging is heavy, gassing and possible bubbling of the electrolyte through the battery vent may cause the formation of harmless white substance (potassium carbonate) on top of the battery. This substance can be removed by brushing with a dry stiff brush or washing the battery with water.

CAUTION: DO NOT USE WIRE BRUSH TO CLEAN BATTERY. ALSO, MAKE SURE THAT VENT PLUGS ARE CLOSED BEFORE CLEANING.

AIR CONDITIONING AND PRESSURIZATION SYSTEM SERVICING

1. Servicing Air-Conditioning System

A. General.

Servicing the air-conditioning system consists of checking and replenishing the Freon charge and lubricant in the Freon package.

CAUTION: THE FOLLOWING SERVICING PROCEDURE APPLIES ONLY WHEN ADDING FREON AND/OR OIL TO AN OPERATIONAL FREON PACKAGE. CHARGING A COMPLETELY VACATED PACKAGE OR A MALFUNCTIONING PACKAGE WHICH HAS BEEN REPAIRED MUST BE ACCOMPLISHED AT OVERHAUL.

B. Equipment Required.

(1) External source of 115/200-volt, 3 phase, 400 cps ac electrical power.

(2) Safety goggles.

WARNING: FREON, WHEN RELEASED TO ATMOSPHERE, WILL VAPORIZE RAPIDLY AND IN DOING SO WILL ABSORB HEAT FROM ANY SURFACE IT CONTACTS. ADEQUATE SAFETY GOGGLES MUST BE WORN AT ALL TIMES WHEN SERVICING OR WORKING ON ANY FREON SYSTEM.

C. Check Freon Liquid Level.

(1) Connect and apply external electrical power to airplane (refer to Chapter 24, ELECTRICAL POWER).

(2) Start air-conditioning system and check Freon liquid level as follows:

(a) Place AUTO-OFF-MAN temperature control switch in MAN position. Toggle manual temperature control MAN HOT-MAN COLD switch to MAN HOT position, then toggle toward MAN COLD position until Freon package starts operating. Hold manual temperature control switch in MAN COLD position for a minimum of 80 seconds after Freon package starts operation. (This will place the sequencing device in the full cold position.) When maximum cooling is obtained, hold manual temperature control switch in MAN HOT position for 30 seconds.

(b) After approximately 10 minutes of operation, and with Freon package still operating, observe liquid level indicator on Freon quantity gage. (Gage is visible through small round window in Freon package access door.)

NOTE: Freon quantity readings shall be taken only when Freon package is operating. Gage readings taken when Freon package is shut down are not accurate as liquid Freon may be trapped in various components of the package.

(3) Freon quantity gage indicator shall be between red "low-charge" mark and black "fill" mark.

(4) If gage indicator is below red mark, the package must be charged with Freon until gage indicator is at black mark.

CAUTION: IF GAGE INDICATES "O" OR BELOW, THERE IS A POSSIBILITY THAT TOO MUCH LUBRICATING OIL HAS BEEN LOST WITH THE FREON. THE PACKAGE SHALL BE REPLACED.

(5) When a Freon package charge is low, an evaluation of the rate of loss of Freon must be made. If the loss occurred over an extended period (several months) the package can be restored to normal operating capacity by adding Freon. However, if the loss of Freon occurred over a relatively short period, excessive Freon leakage is indicated and the package shall be replaced.

NOTE: To replenish the Freon charge and lubricant in the Freon packages, refer to Chapter 21, AIR CONDITIONING.

2. Servicing Pressurization System

A. General.

Servicing the pressurization system consists of checking and replenishing the turbocompressor oil.

B. Equipment Required.

(1) Small hand mirror.

(2) Approximately 10 inches of clear rubber tubing.

(3) Syringe or equivalent to add oil to turbocompressor.

C. Service Turbocompressor.

(1) With Turbocompressors shut down, check oil level as follows:

(a) Open both turbocompressor access doors.

(b) Locate turbocompressor oil sump between turbine and impeller sections.

NOTE: The sump is a small rectangular box on the bottom of the turbocompressor center section.

(c) Observe oil level of each turbocompressor (using small mirror) in sight line gage on left side of sump.

NOTE: Sight line level is marked on transparent circular window on side of sump.

(d) If oil level is above sight line, oil quantity is sufficient.

(e) If oil level is below sight line, add oil as outlined in paragraph D.

D. Add Oil to Turbocompressor.

CAUTION: SERVICE TURBOCOMPRESSOR WITH OIL, SPECIFICATION MIL-L-6085 OR MIL-L-6085A ONLY. DO NOT MIX WITH OTHER TYPE OILS.

(1) Cut safety wire and remove filler plug from left side of turbocompressor oil sump.

NOTE: In step (2) use rubber tubing and some method of pumping, such as a rubber syringe, to add oil to sump.

(2) Fill sump to lip of filler plug; sump capacity is approximately ten ounces.

(3) Replace filler plug and secure with safety wire; wipe up any excess or spilled oil.

E. Drain Turbocompressor Oil Sump.

(1) Cut safety wire from two bolts in bottom of turbocompressor oil sump.

(2) Support sump in position and remove bolts.

(3) Lower sump carefully to prevent damage to oil feed wicks to avoid spilling oil.

(4) Pour out oil and clean sump with clean, lint free cloth.

(5) Position and support sump (with oil filler plug on left side) under turbocompressor; install and secure two bolts with safety wire.

NOTE: Use new gasket on sump for installation.

3. Servicing Forward or Aft Pressure Regulator and Outflow Valve Cabin Air Filter

A. Equipment Required.

(1) Cleaning solvent - Federal Specification PS-661.

(2) Filter element, Part No. CR73927C (Mine Safety Appliance Co., Los Angeles, Calif. or Pittsburgh, Pa.).

B. Remove Filter Element.

(1) Remove pressure ergulator and outflow valve cabin air filter assembly (refer to Chapter 21, AIR CONDITIONING).

(2) Remove filter element from filter housing; discard element.

C. Install Filter Element.

(1) Clean filter housing and orifice with cleaning solvent.

<u>WARNING</u>: USE CLEANING SOLVENT IN WELL VENTILATED AREA. AVOID BREATHING FUMES AND KEEP SOLVENT AND FUMES AWAY FROM OPEN FLAME.

(2) Install new filter element (Part No. CR73927C) in filter housing.

(3) Install cabin air filter assembly on pressure regulator and outflow valve (refer to Chapter 21, AIR CONDITIONING).

4. <u>Servicing Cabin Pressure Controller Air Filter</u>

A. Equipment Required.

(1) Cleaning solvent - Federal Specification PS-661.

(2) Filter element, Part No. CR73927C (Mine Safety Applicance Co., Los Angeles, Calif. or Pittsburgh, Pa.).

B. Remove Filter Element.

(1) Remove cabin pressure controller air filter assembly (refer to Chapter 21, AIR CONDITIONING).

(2) Remove filter element from filter housing; discard filter.

C. Install Filter Element.

(1) Clean filter housing and orifice with cleaning solvent.

<u>WARNING</u>: USE CLEANING SOLVENT IN WELL VENTILATED AREA. AVOID BREATHING FUMES AND KEEP SOLVENT AND FUMES AWAY FROM OPEN FLAME.

(2) Install new filter element (Part No. CR73927C) in filter housing.

(3) Install cabin pressure controller air filter assembly (refer to Chapter 21, AIR CONDITIONING).

ACCESS AND INSPECTION PROVISIONS

1. Exterior Access Doors and Panels

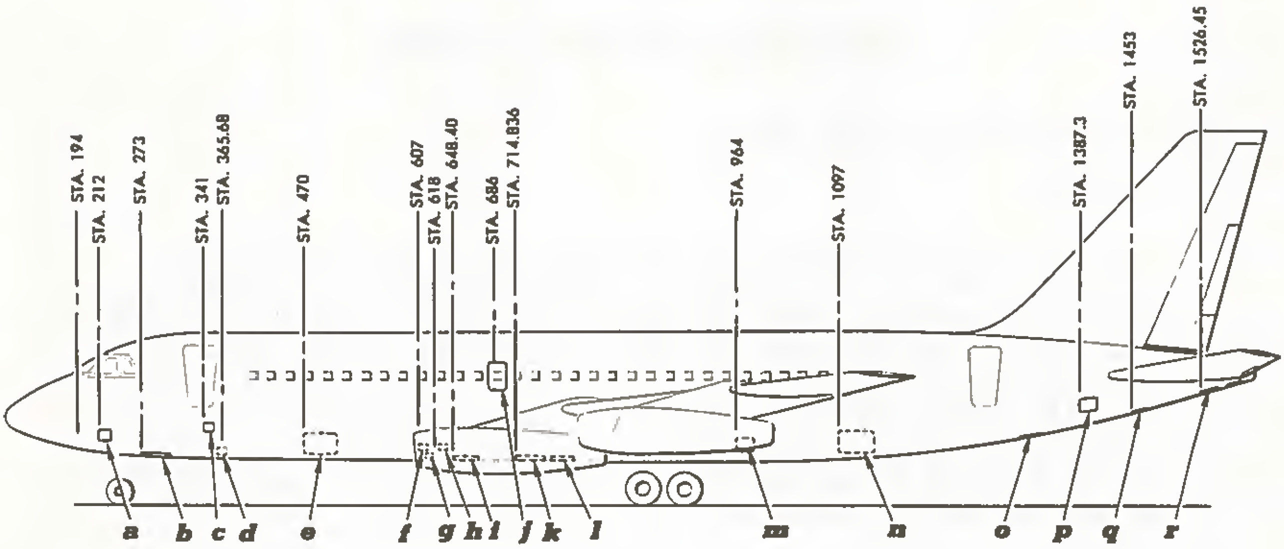
A. General.

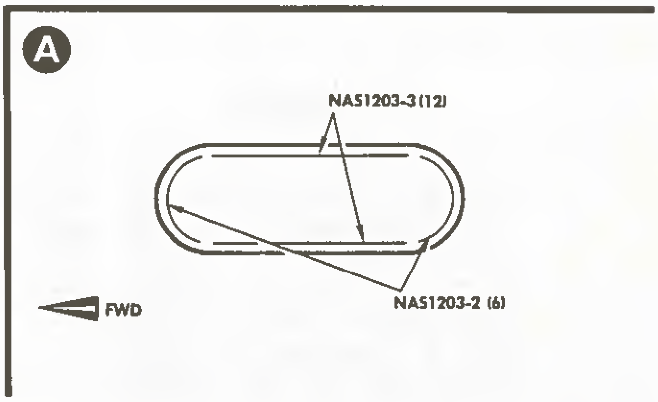
Numerous doors and panels are provided throughout the airplane to facilitate access to various areas and components for inspection and/or maintenance. The illustrations on the following pages show the location of the doors and panels along with their respective type, length and number of fasteners. The STENCIL NUMBER column on each figure lists the numbers which are stencilled on the exterior of each door or panel. These "stencil" numbers correspond to the numbers on the airplane structure adjacent to each door or panel, and are for identification and location purposes.

2. Exterior Access Door and Panel Illustrations

TABLE I

Illustration	Figure Number
Fuselage Access Doors and Panels	201
Aileron Access Doors and Panels	201A
Wing Upper Surface Access Doors and Panels	202
Wing Lower Surface Access Doors and Panels	203
Wing Leading Edge Sections	204
Wing to Fuselage Fairings	205
Engine Pod and Pylon Access Doors, Panels and Fairings	206
Horizontal Stabilizer, Elevator and Trim Tab Access Doors and Panels	207
Vertical Stabilizer, Rudder, Trim Tab and Flight Tab Access Doors and Panels	208





KEY ITEM	PART NAME and/or "STENCILLED NAME"	SEE DETAIL	FASTENER	TOTAL
a	DOOR, ELECTRICAL EQUIPMENT "TUNNEL"		HANDLE	
b	DOOR, ELECTRICAL AND ELECTRONIC		HANDLE	
c	DOOR, FORWARD LAVATORY SERVICE		QUICK-TYPE	
d	DOOR, EXTERNAL POWER		QUICK-TYPE	
e	DOOR, FORWARD CARGO COMPARTMENT		HANDLE	
f	DOOR, WATER FILLER		QUICK-TYPE	
g	DOOR, AIR CONDITIONING GROUND CONNECTION		QUICK-TYPE	
h	DOOR, GROUND TURBINE COMPRESSOR CONNECTION		LATCH	
i	DOOR, TURBO COMPRESSOR		QUICK-TYPE	
j	DOOR, EMERGENCY EXIT		LATCH	
k	DOOR, HEAT EXCHANGER		QUICK-TYPE	
l	DOOR, REFRIGERATION PACKAGE		QUICK-TYPE	
m	DOOR, HYDRAULIC COMPARTMENT		HANDLE	
n	DOOR, AFT CARGO COMPARTMENT		HANDLE	
o	DOOR, AFT LAVATORY SERVICE		QUICK-TYPE	
p	DOOR, AFT FUSELAGE		QUICK-TYPE	
q	PANEL, TORQUE TUBE	A	NAS1203-2 -3	6 12
r	DOOR, TAIL CONE		QUICK-TYPE	

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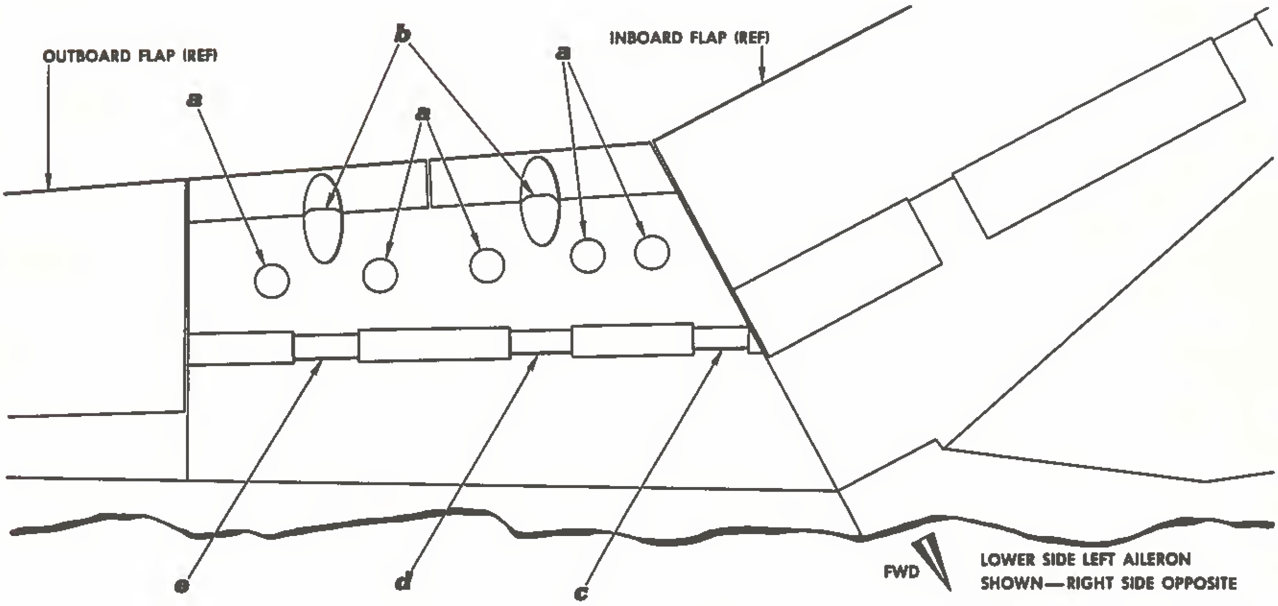
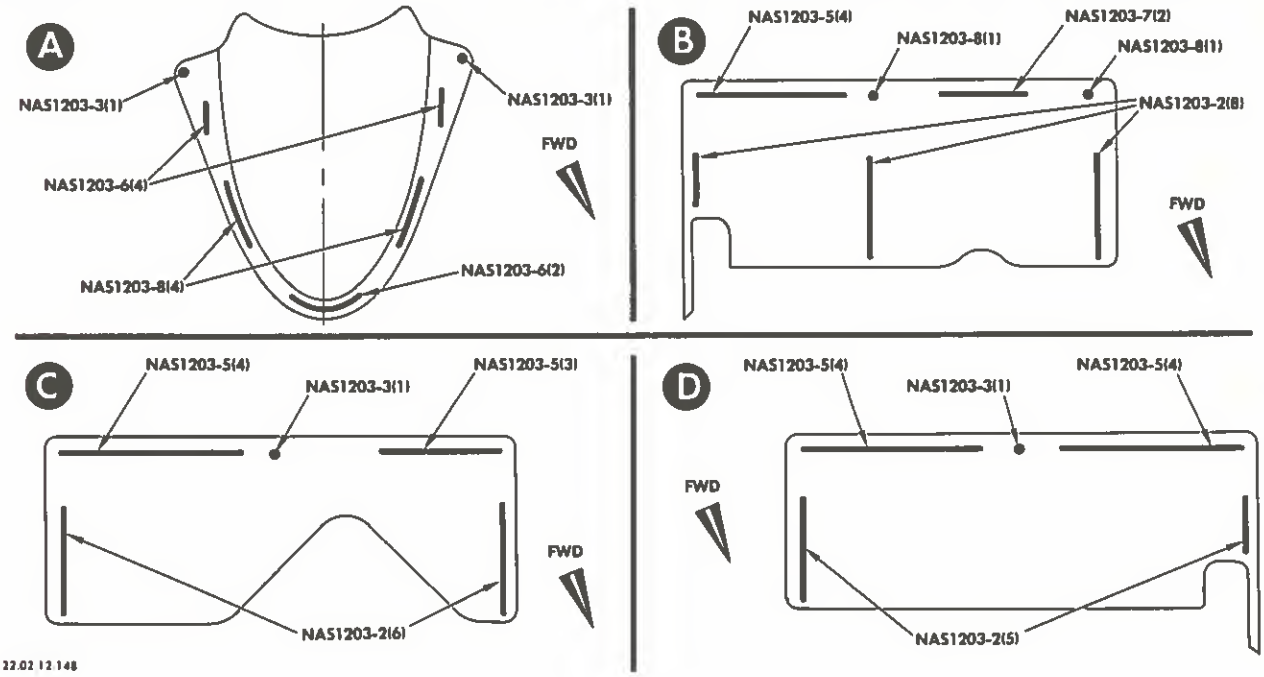
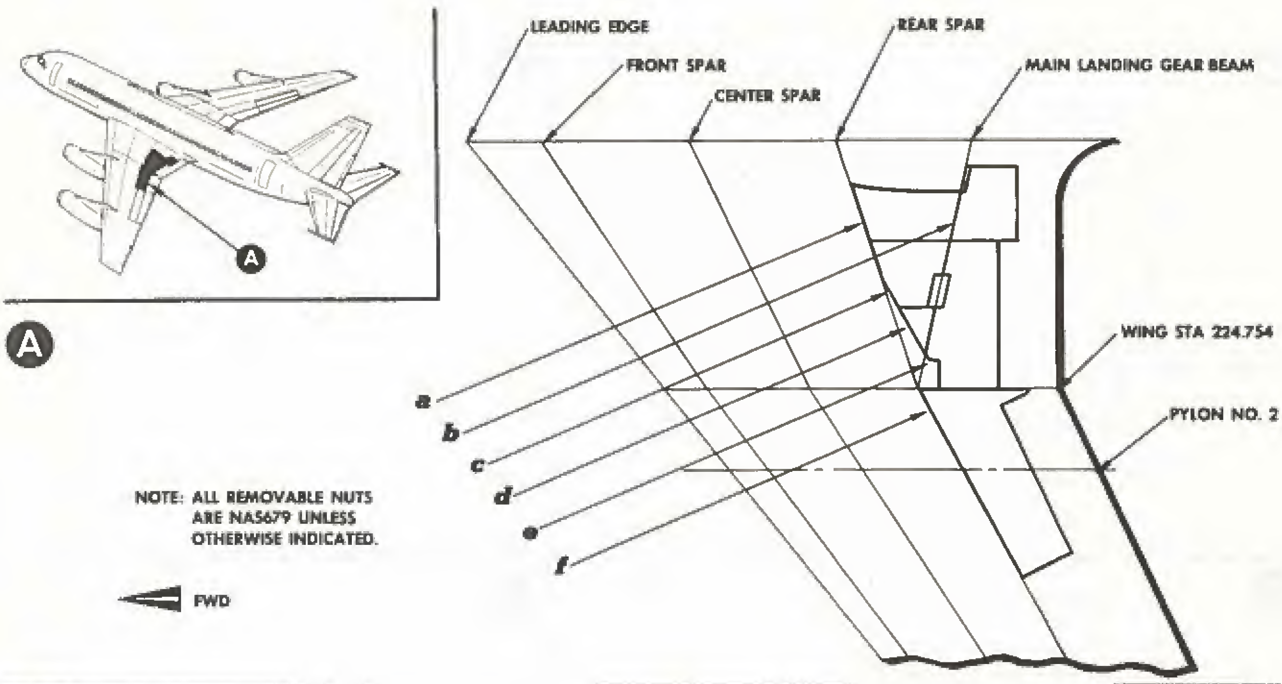
Fuselage Access Doors and Panels
Figure 201



KEY ITEM	PART NAME and/or "STENCILLED NAME"	SEE DETAIL		FASTENER	TOTAL
a	PANEL			NAS1203-3	8
b	FAIRING	A		NAS1203-3	2
				-6	6
				-8	4
c	FAIRING	B		NAS1203-2	8
				-5	4
				-7	2
				-8	2
d	FAIRING	C		NAS1203-2	6
				-3	1
				-5	7
e	FAIRING	D		NAS1203-2	5
				-3	1
				-5	8



Aileron Access Doors and Panels
Figure 201A



NOTE: ALL REMOVABLE NUTS ARE NAS679 UNLESS OTHERWISE INDICATED.

KEY ITEM	PART NAME and/or "STENCILLED NAME"	SEE DETAIL	STENCIL NUMBER of PART LH	CENTER	RH	FASTENER	TOTAL
a	PANEL	B	133		134	NAS1203-15	10
						-14	6
						-13	7
						-12	1
						-11	64
						- 9	89
						- 5	30
b	PANEL	C	141		142	NAS1203-14	9
						-13	6
						-12	4
						-11	11
						- 9	142
						- 5	12
						- 4	17
c	PANEL	D	135		136	NAS1203-13	4
						-12	4
						-11	16
						-10	98
						- 9	1
						- 5	58
d	PANEL	E	137		138	NAS1203-11	11
						- 7	16
						- 6	18
e	PANEL	F	143		144	NAS1203-12	20
						-11	8
						-10	141
						- 5	56
f	PANEL	G	139		140	NAS1203-18	20
						-17	2
						-13	10
						-12	8
						-11	52
						-10	208
						- 9	22
						- 4	42
						NAS1204- 9	2
						- 8	15
						- 7	1
						- 6	15
						- 4	19

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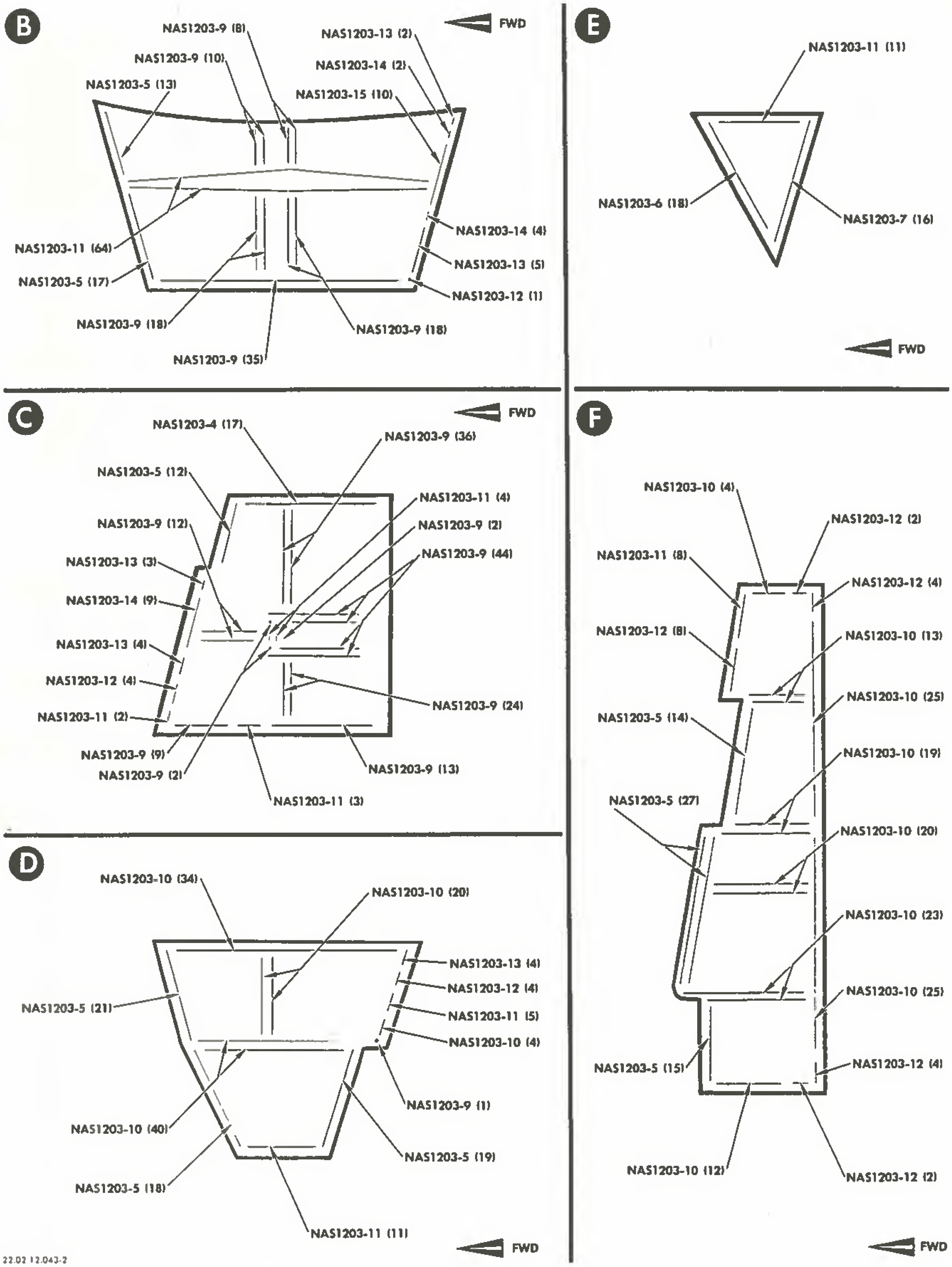
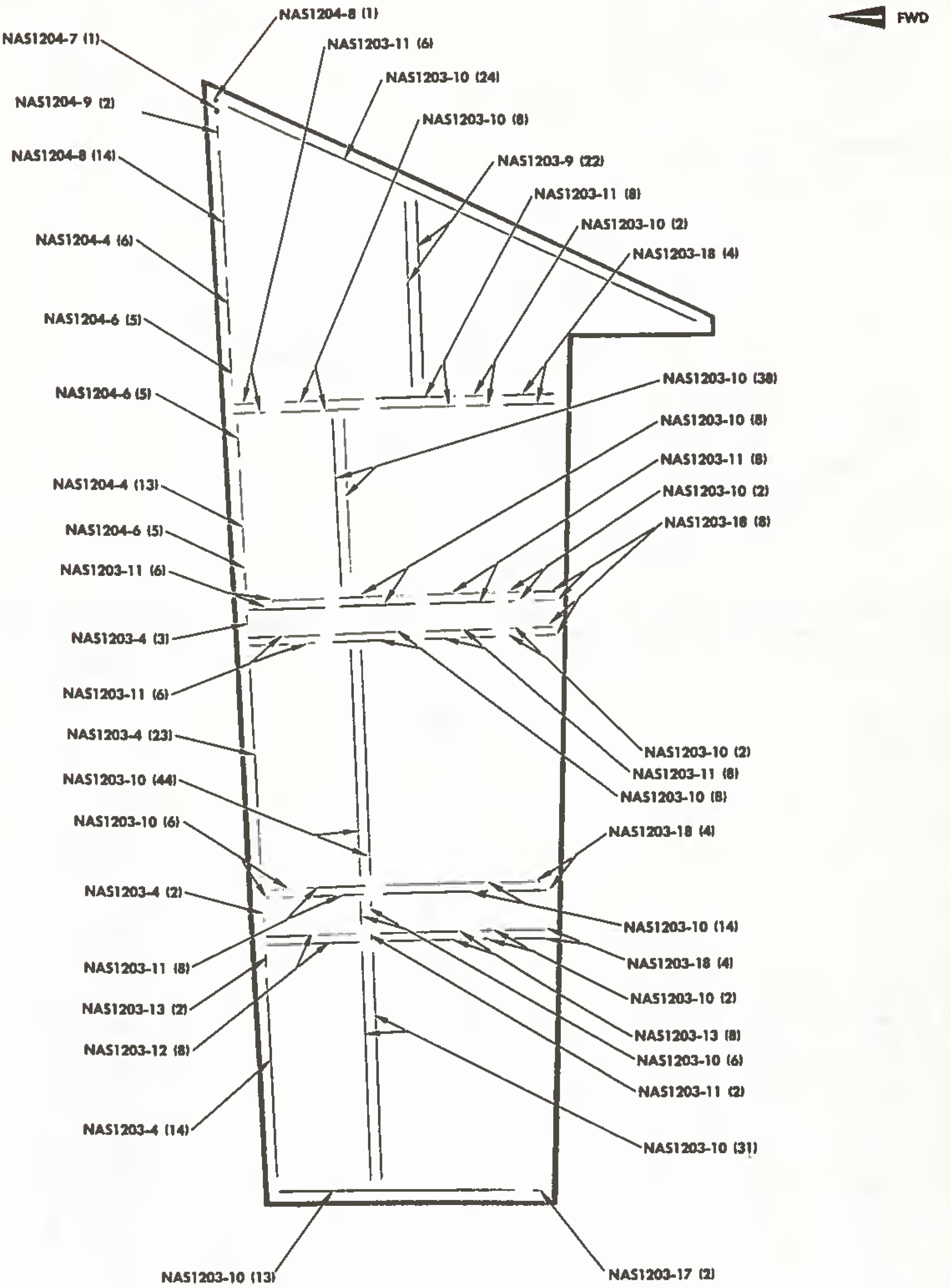
Wing Upper Surface Access Doors and Panels
Figure 202 (Sheet 1 of 3)



Wing Upper Surface Access Doors and Panels
Figure 202 (Sheet 2 of 3)

G



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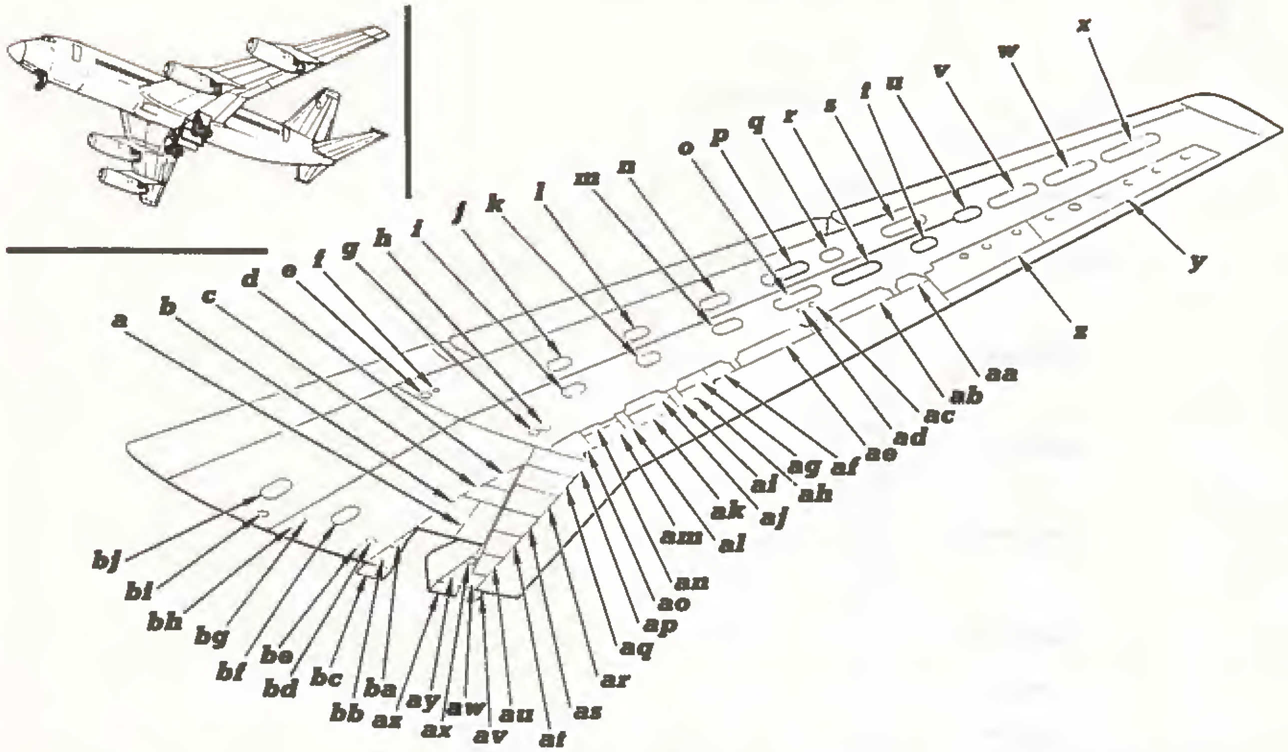
Wing Upper Surface Access Doors and Panels
Figure 202 (Sheet 3 of 3)



KEY ITEM	PART NAME and/or "STENCILLED NAME"	SEE DETAIL	STENCIL NUMBER of PART LH	CENTER	RH	FASTENER	TOTAL
a	PANEL	A E	131		132	NAS1203-9 -10 -11 -12 -13 -14 -15 -16	18 62 4 5 5 3 3 2
b	PANEL	B	75		76	NAS1203-5 -10	27 83
c	PANEL	I	77		78	NAS1203-4 -6 -9 -11 NAS1204-6	19 18 25 11 2
d	PANEL	D	79		80	NAS1203-6 -11	33 11
e	PANEL		15		16	NAS334PA10	12
f	PANEL		17		18	NAS33PA10-5	5
g	PANEL		19		20	NAS334PA11	12
h	PANEL		21		22	NAS334PA11	12
i	PANEL		25		26	NAS334CPA10	58
j	PANEL		23		24	NAS334CPA6	58
k	PANEL		29		30	NAS334CPA10	58
l	PANEL		27		28	NAS334CPA6	58
m	PANEL		33		34	NAS334CPA7	58
n	PANEL		31		32	NAS334CPA6	58
o	PANEL		37		38	NAS334CPA6-5	82
p	PANEL		35		36	NAS334CPA6	82
q	PANEL		43		44	NAS334CPA6	50
r	PANEL		45		46	NAS334CPA6-5	82
s	PANEL		47		48	NAS334CPA6	78
t	PANEL		49		50	NAS334CPA6	50
u	PANEL		51		52	NAS334PA5-5	50

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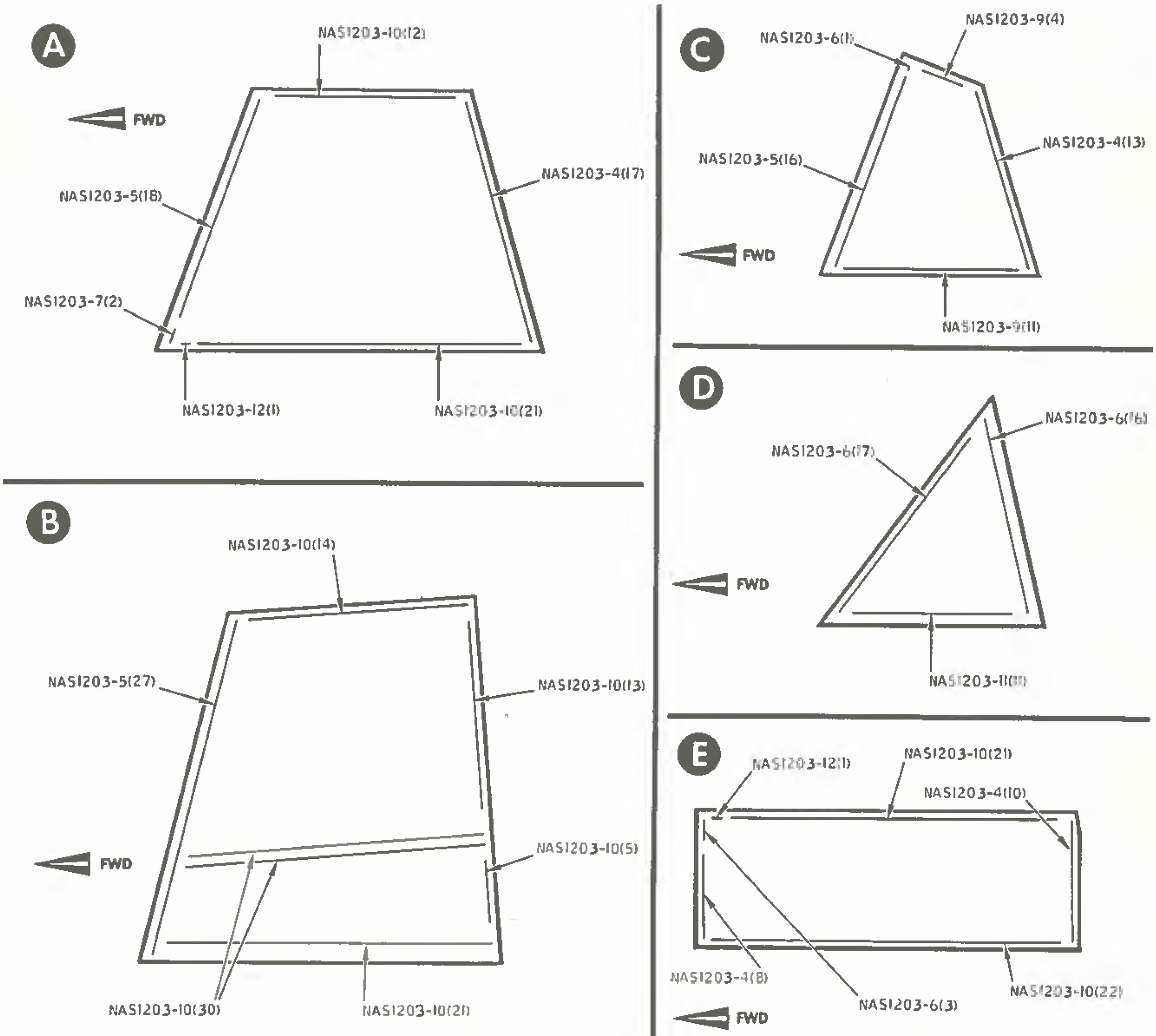
CONTINUED

Wing Lower Surface Access Doors and Panels
Figure 203 (Sheet 1 of 7)



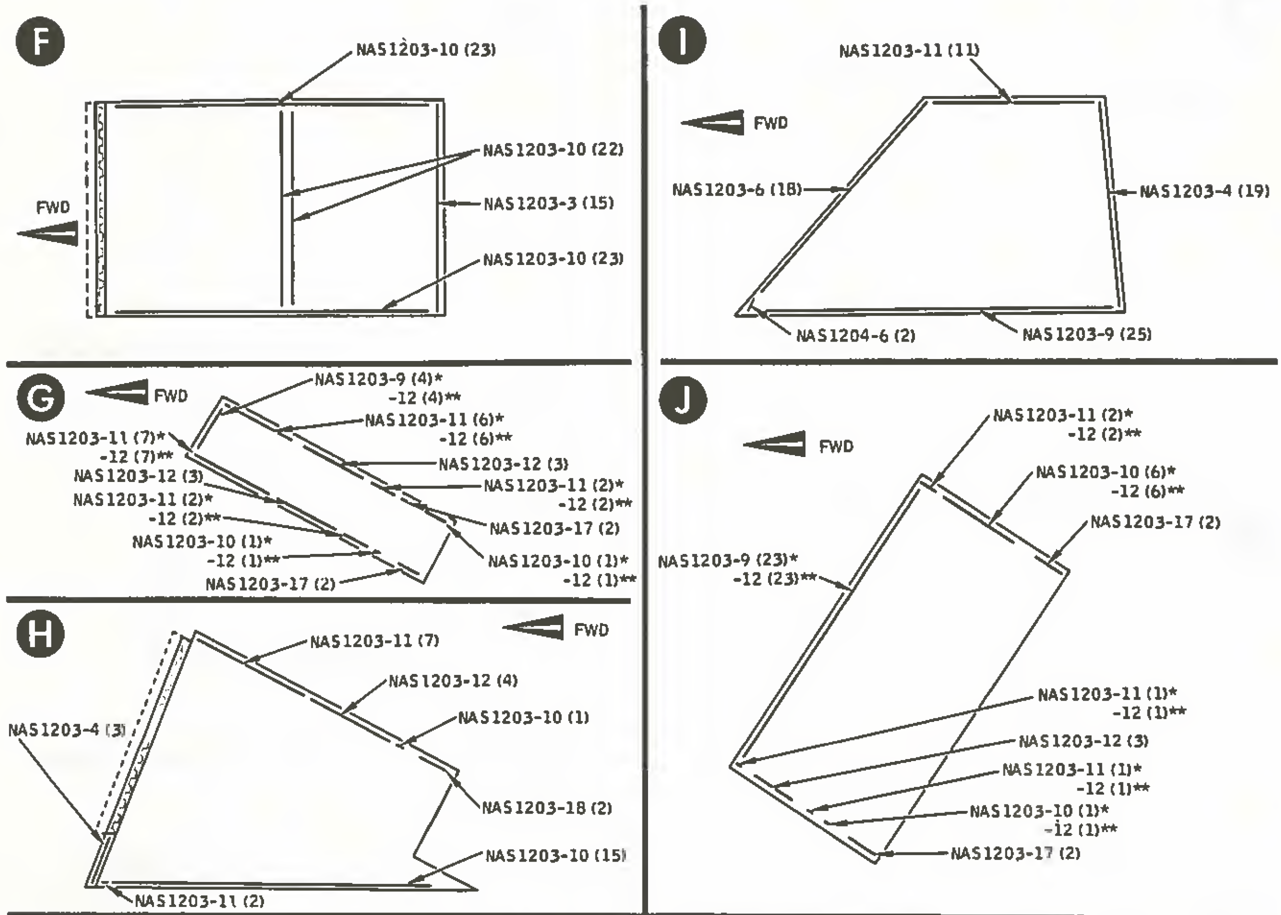
KEY ITEM	PART NAME and/or "STENCILLED NAME"	SEE DETAIL	STENCIL NUMBER of PART LH	CENTER	RH	FASTENER	TOTAL
v	PANEL		53		54	NAS334PA5-5	80
w	PANEL		55		56	NAS334PA5-5	80
x	PANEL		57		58	NAS334PA5-5	88
y	PANEL	Q	105		106	NAS1203-4	221
						-5	2
						-6	24
						-7	138
						-8	18
z	PANEL	S	103		104	NAS1103-3	11
						-4	3
						-5	3
						-9	25
						-11	9
						NAS1203-4	138
						-9	143
						-10	10
aa	PANEL 1648	R	101		102	NAS1203-3	19*
						-4	12*
						-4	9
						-5	1
						-5	32**

*Applicable to airplanes N802TW through N806TW
22.02 12.072 2

**Applicable to airplanes N801TW and N807TW through N830TW

Fasteners without * or ** applicable to all airplanes.

Wing Lower Surface Access Doors and Panels
Figure 203 (Sheet 2 of 7)

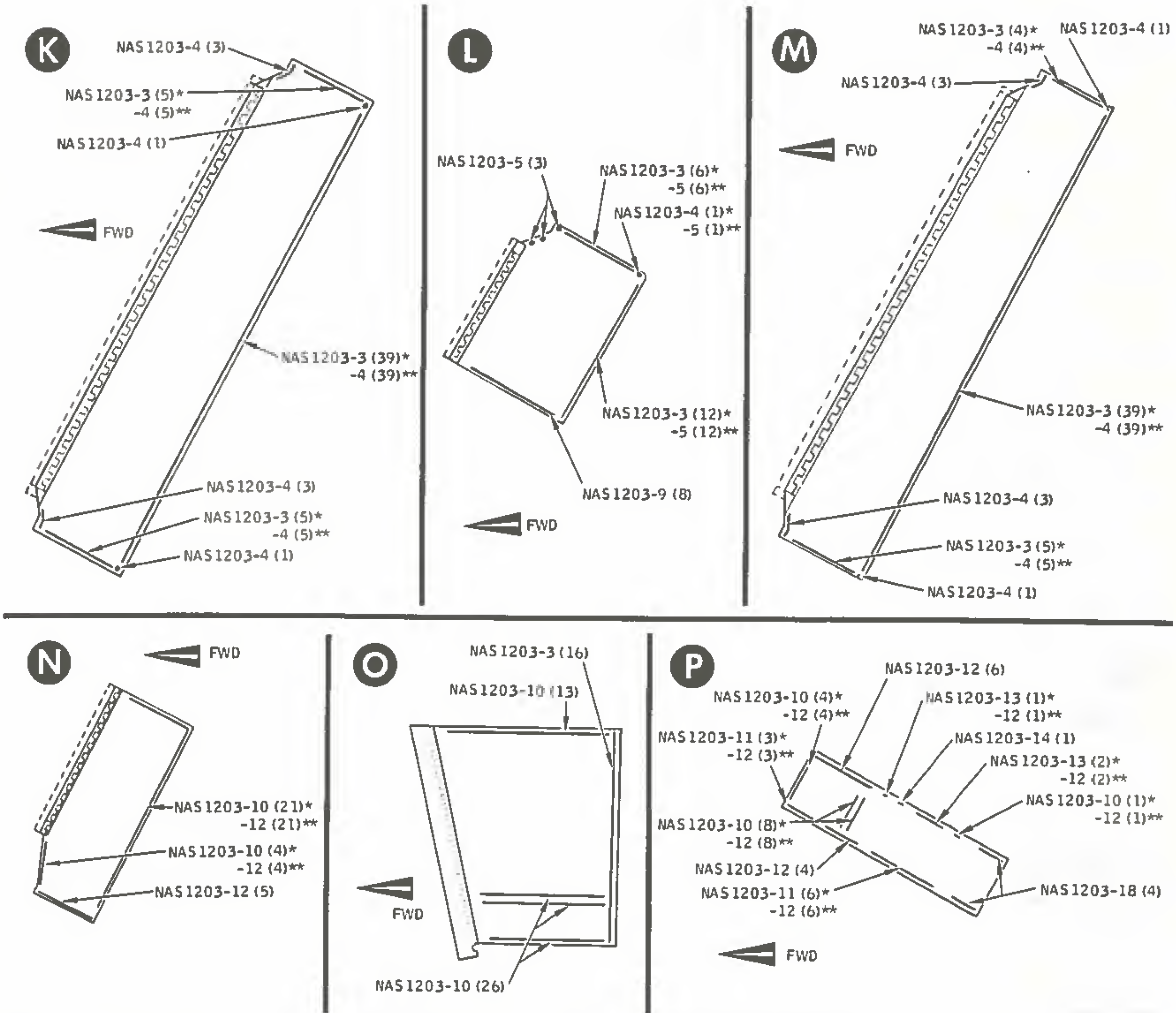


KEY ITEM	PART NAME and/or "STENCILLED NAME"	SEE DETAIL	STENCIL NUMBER of PART LH	CENTER	RH	FASTENER	TOTAL
ab	DOOR 16640	M	99		100	NAS1203-3 -4 -4	48* 8* 56**
ac	PANEL		41		42	NAS334PA10	12
ad	PANEL		39		40	NAS334PA10	5
ae	DOOR 16639	K	97		98	NAS1203-3 -4 -4	49* 8* 57**
af	DOOR 16638	L	95		96	NAS1203-3 -4 -5 -5 -9	18* 1* 3* 22** 8
ag	DOOR 16636	N	93		94	NAS1203-10 -12 -12	25* 5* 30**
ah	DOOR 16637	AC	129		130	NAS1203-9 -10 -11 -12 -13 -13 -14 -17 -17	9* 12* 2* 1* 5* 29** 1* 5** 4*

*Applicable to airplanes N802TW through N806TW
**Applicable to airplanes N801TW and N807TW through N830TW
Fasteners without * or ** applicable to all airplanes.

22.02 12.072-3

Wing Lower Surface Access Doors and Panels
Figure 203 (Sheet 3 of 7)

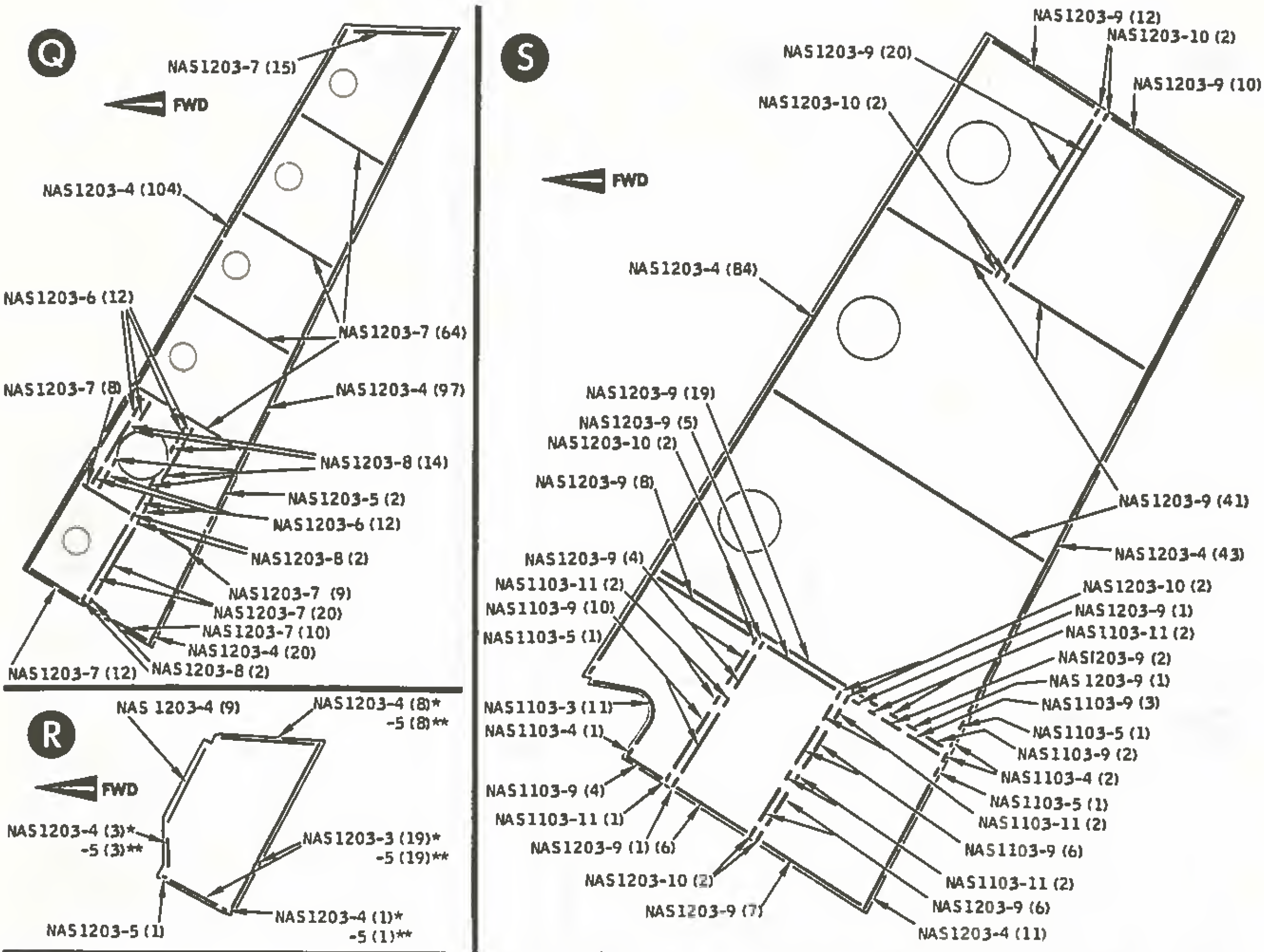


KEY ITEM	PART NAME and/or "STENCILLED NAME"	SEE DETAIL	STENCIL NUMBER of PART LH	CENTER	RH	FASTENER	TOTAL
ai	PANEL 16635	P	91		92	NAS1203-10	13*
						-11	9*
						-12	10*
						-12	35**
						-13	3*
						-14	1
						-18	4
aj	DOOR 16633	A G	89		90	NAS1203-10	34*
						-11	9*
						-11	43**
ak	PANEL 16634	J	127		128	NAS1203-9	23*
						-10	7*
						-11	4*
						-12	3*
						-12	37**
						-17	4
al	PANEL 16632	G	87		88	NAS1203-9	4*
						-10	2*
						-11	17*
						-12	6*
						-12	29**
						-17	4

*Applicable to airplanes N802TW through N806TW
**Applicable to airplanes N801TW and N807TW through N830TW
Fasteners without * or ** applicable to all airplanes.

22 02 12.072-4

Wing Lower Surface Access Doors and Panels
Figure 203 (Sheet 4 of 7)

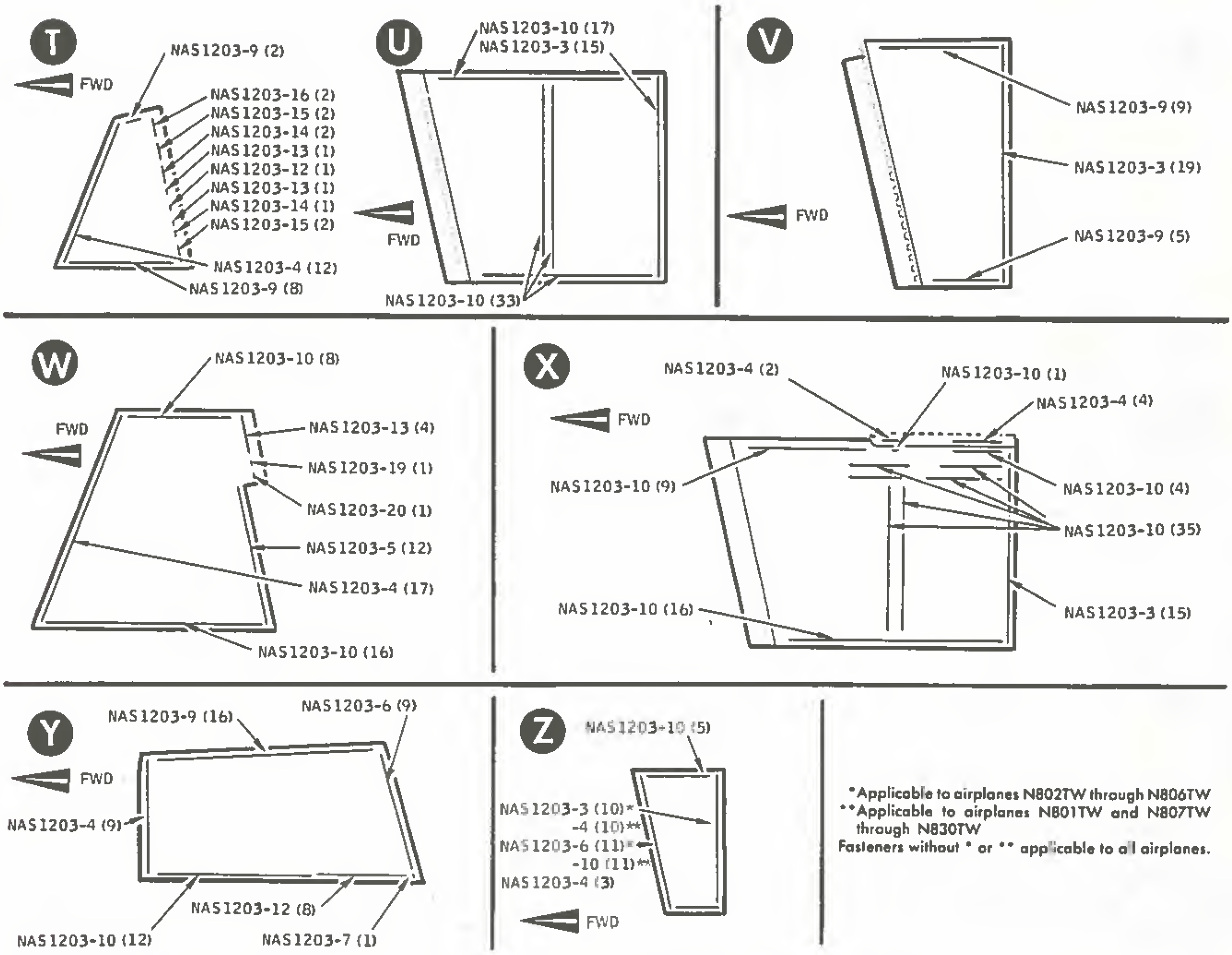


KEY ITEM	PART NAME and/or "STENCILLED NAME"	SEE DETAIL	STENCIL NUMBER of PART LH	CENTER	RH	FASTENER	TOTAL
am	PANEL 14631	A F	125		126	NAS221-29 NAS1203-10 -11 -12 -13 -13 -17 NAS1103-9 -11	2 12 2* 4* 8* 2 14** 4 4 2
an	DOOR 16630	A D	85		86	NAS1203-3 -10 -11 -11 NAS1103-11 -8	6 16* 13 29** 2 2
ao	DOOR 16629	H	83		84	NAS1203-4 -10 -11 -12 -18	3 16 9 4 2
ap	DOOR 16628	F	81		82	NAS1203-3 -10	15 68
aq	DOOR 16627	A B	123		124	NAS1203-10 -3	82 15
ar	DOOR 16626	X	121		122	NAS1203-3 -4 -10	15 6 65

*Applicable to airplanes N802TW through N806TW **Applicable to airplanes N801TW and N807TW through N830TW Fasteners without * or ** applicable to all airplanes.

22.02.12.072-5

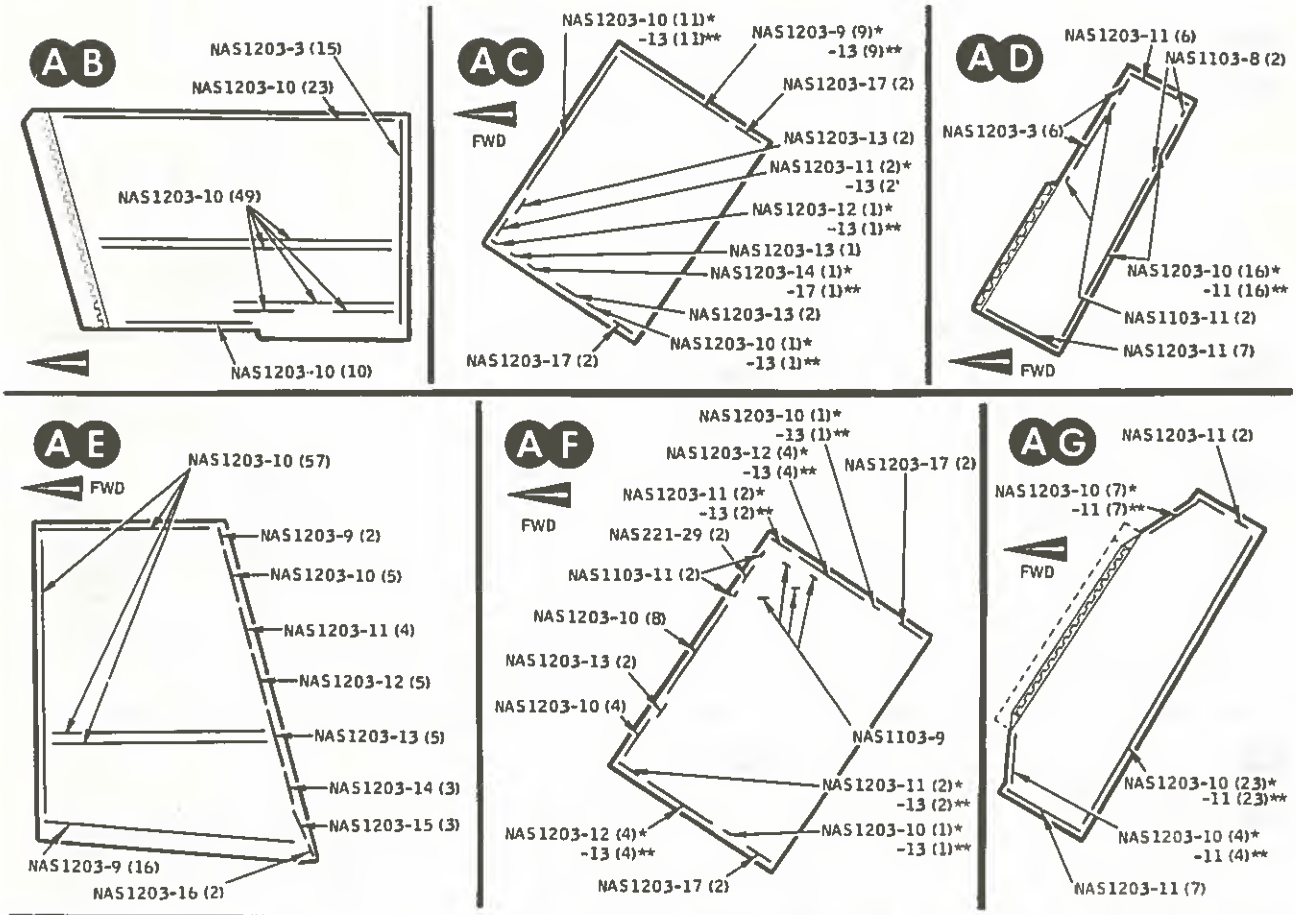
Wing Lower Surface Access Doors and Panels
Figure 203 (Sheet 5 of 7)



KEY ITEM	PART NAME and/or "STENCILLED NAME"	SEE DETAIL	STENCIL NUMBER of PART LH	CENTER	RH	FASTENER	TOTAL
as	DOOR 16625	U	119		120	NAS1203-3 -10	15 50
at	DOOR 16624	O	117		118	NAS1203-3 -10	16 39
au	DOOR 16623	V	115		116	NAS1203-3 -9	19 14
av	DOOR					NAS1203-3	21
aw	PANEL 16622	Z	113		114	NAS1203-3 -4 -4 -6 -10 -10	10* 3* 13** 11* 5* 16**
ax	PANEL	T	111		112	NAS1203-4 -9 -12 -13 -14 -15 -16	12 10 1 2 3 4 2
ay	PANEL	W	109		110	NAS1203-4 -5 -10 -13 -19 -20	17 12 24 4 1 1

22.02.12.072-6

Wing Lower Surface Access Doors and Panels
Figure 203 (Sheet 6 of 7)

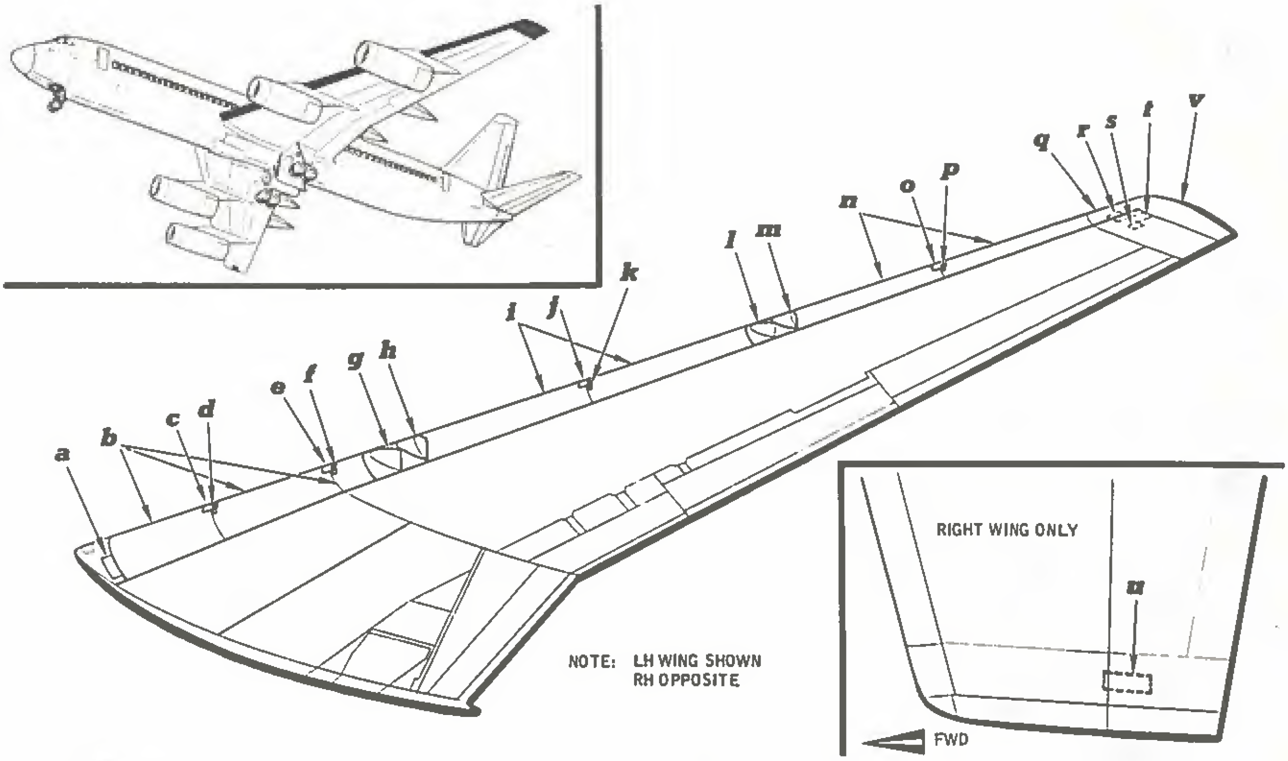


KEY ITEM	PART NAME and/or "STENCILLED NAME"	SEE DETAIL	STENCIL NUMBER of PART LH	CENTER	RH	FASTENER	TOTAL
az	PANEL	Y	107		108	NAS1203-4	9
						-6	9
						-7	1
						-9	16
						-10	12
						-12	8
ba	PANEL	C	73		74	NAS1203-4	13
						-5	16
						-6	1
						-9	15
bb	PANEL	A	71		72	NAS1203-4	17
						-5	18
						-7	2
						-10	33
						-12	1
bc	PANEL	E	69		70	NAS1203-4	18
						-6	3
						-10	43
						-12	1
bd	PANEL		13		14	NAS334PA11	12
be	PANEL		11		12	NAS334PA11	12
bf	PANEL		9		10	NAS334PA7	62
bg	PANEL		5		6	NAS334PA10-5	5
bh	PANEL		3		4	NAS334PA10-5	12
bi	PANEL		7		8	NAS334PA10-5	12
bj	PANEL		1		2	NAS334PA6-5	62

*Applicable to airplanes N802TW through N806TW
**Applicable to airplanes N801TW and N807TW and on.
Fasteners without * or ** applicable to all airplanes.

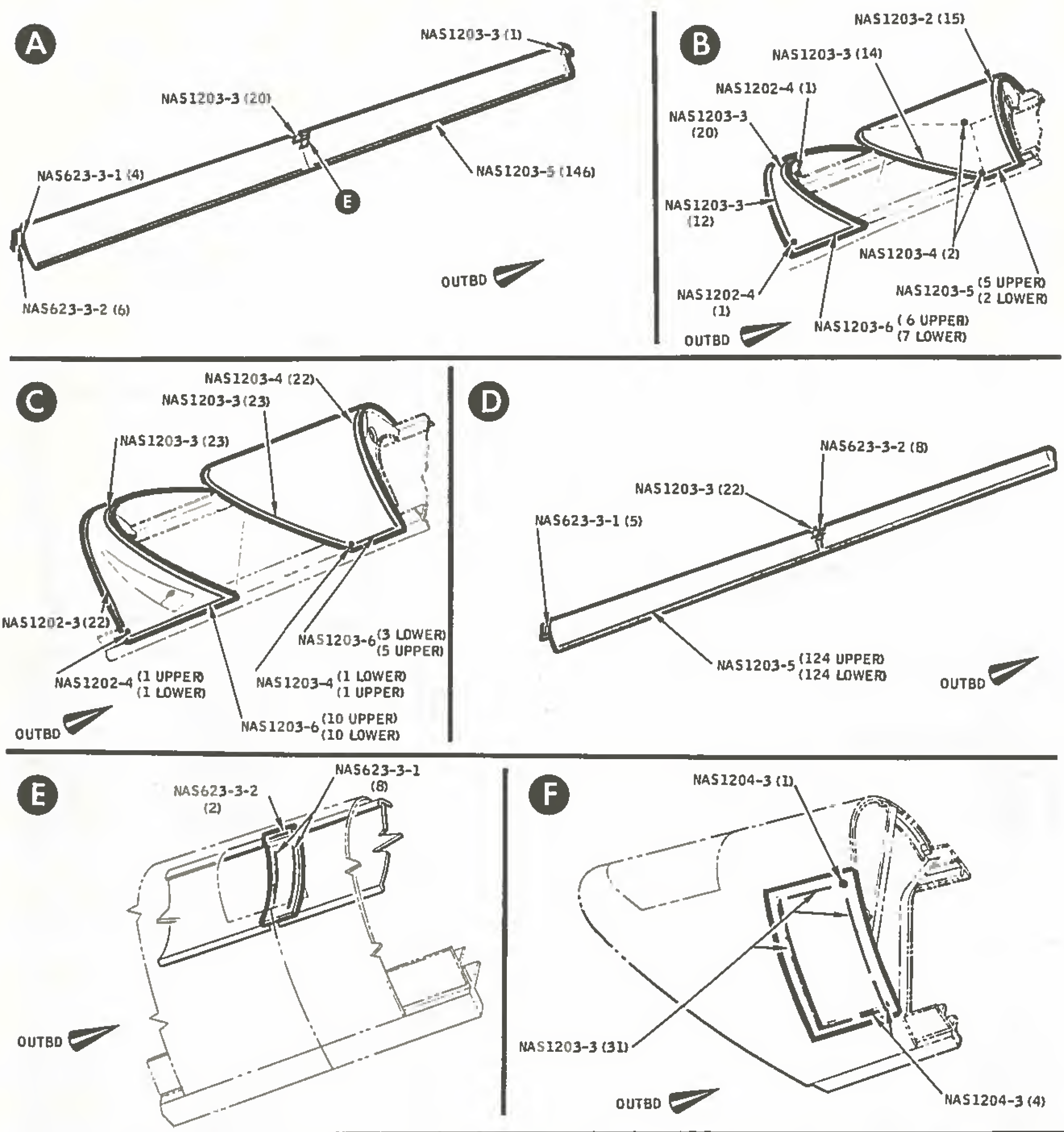
22.02.12.072 7

Wing Lower Surface Access Doors and Panels
Figure 203 (Sheet 7 of 7)



KEY ITEM	PART NAME and/or "STENCILLED NAME"	SEE DETAIL	FASTENER	TOTAL
a	PANEL	F	NAS1204-3 NAS1203-3	5 31
b	LEADING EDGE SECTIONS		NAS1203-6	236
c	PANEL		NAS1203-3	20
d	PANEL		NAS623-3-1	12
e	PANEL		NAS1203-3	20
f	PANEL		NAS623-3-1	12
g	LEADING EDGE SECTION	C	NAS1202-3 -4 NAS1203-3 -6	22 2 23 20
h	LEADING EDGE SECTION	C	NAS1203-3 -4 -6	23 24 8
i	LEADING EDGE SECTIONS	A	NAS1203-3 -5 NAS623-3-1 -2	21 146 6 4
j	PANEL		NAS1203-3	20
k	PANEL	E	NAS623-3-1 -2	8 2
l	LEADING EDGE SECTION	B	NAS1203-3 NAS1202-4 -6	32 2 13
m	LEADING EDGE SECTION	B	NAS1203-2 -3 -4 -5	15 14 2 7
n	LEADING EDGE SECTIONS	D	NAS1203-2 -3 -5 NAS623-3-1	6 26 248 5
o	PANEL		NAS1203-3	22
p	PANEL		NAS623-3-2	8
q	LEADING EDGE SECTION 22.02.12.052-1	DETAIL TO BE FURNISHED AT A LATER DATE	NAS560HK3P-4 -3 NAS1208-14	62 2 2

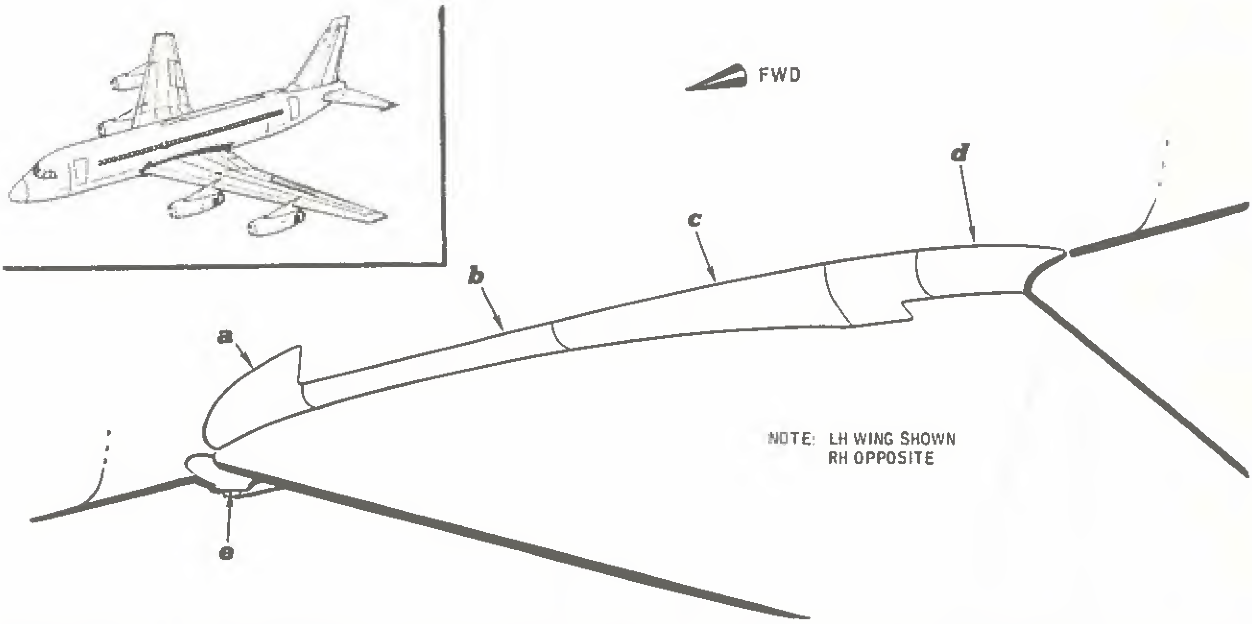
Wing Leading Edge Sections
Figure 204 (Sheet 1 of 2)



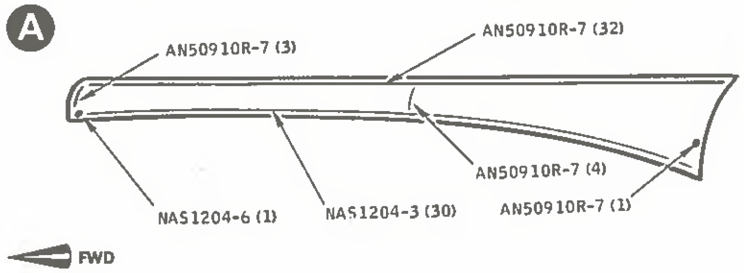
KEY ITEM	PART NAME and/or "STENCILLED NAME"	SEE DETAIL	FASTENER	TOTAL
I	PANEL		NAS560HK3P-4	20
S	PANEL		NAS560HK3P-4	20
I	PANEL		NAS560HK3P-4	15
II	PANEL		NAS560HK3P-4	18
V	PANEL		NAS560HK3P-4	80

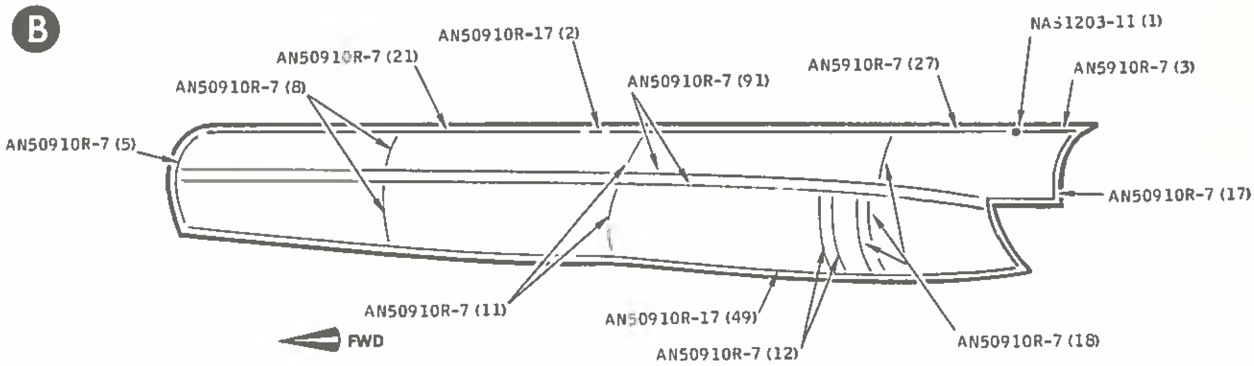
27.02.12.032-2

Wing Leading Edge Sections
Figure 204 (Sheet 2 of 2)



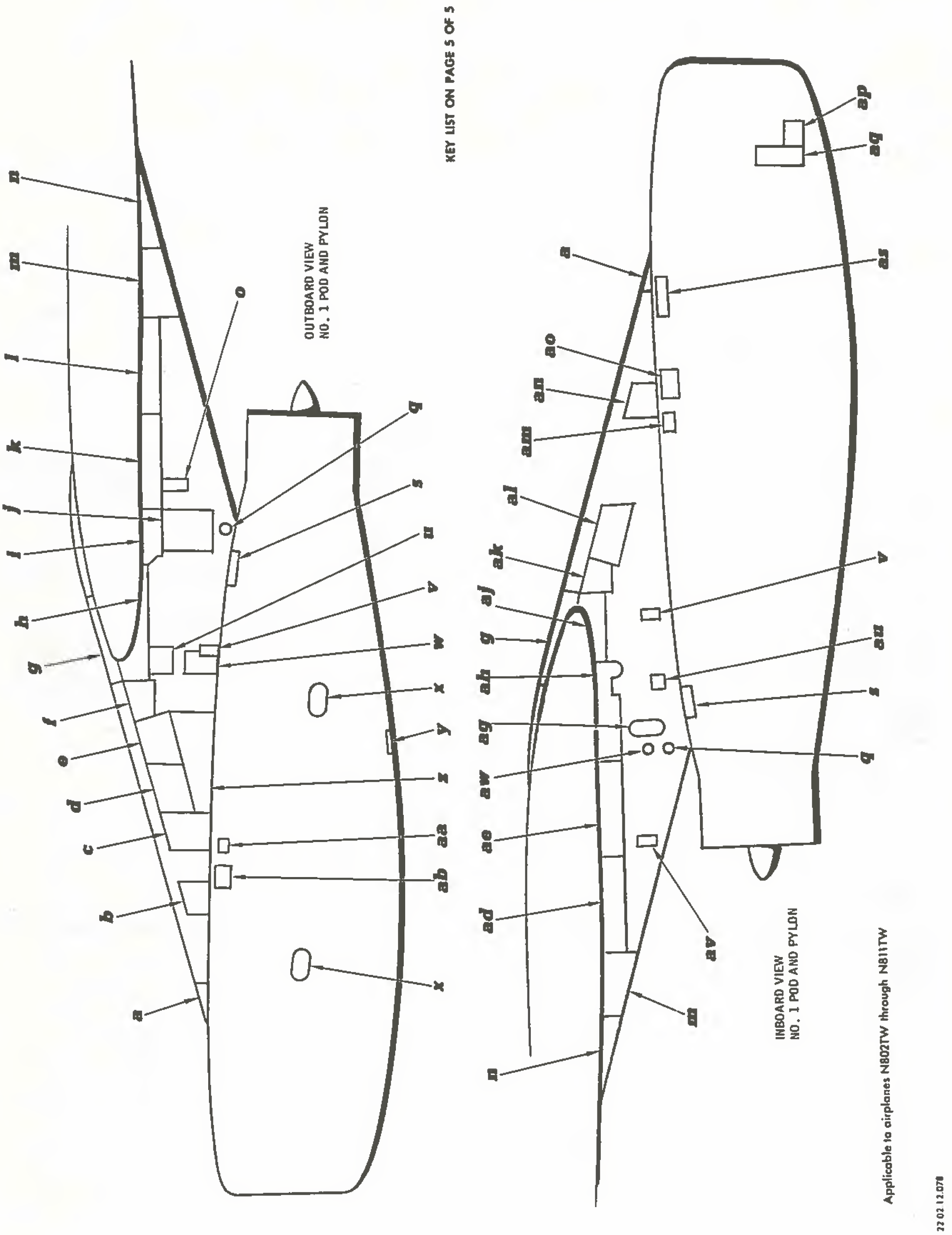
KEY ITEM	PART NAME and/or "STENCILLED NAME"	SEE DETAIL	FASTENER	TOTAL
a	FAIRING		AN509-10R-9	65
b	FAIRING	A	AN509-10R-7	40
			NAS1204-3	30
			-6	1
c	FAIRING	B	AN509-10R-7	213
			-17	51
			NAS1204-3	22
			NAS1203-11	1
d	FAIRING		A509-10R-7	72
e	FAIRING		AN509-10R-9	91



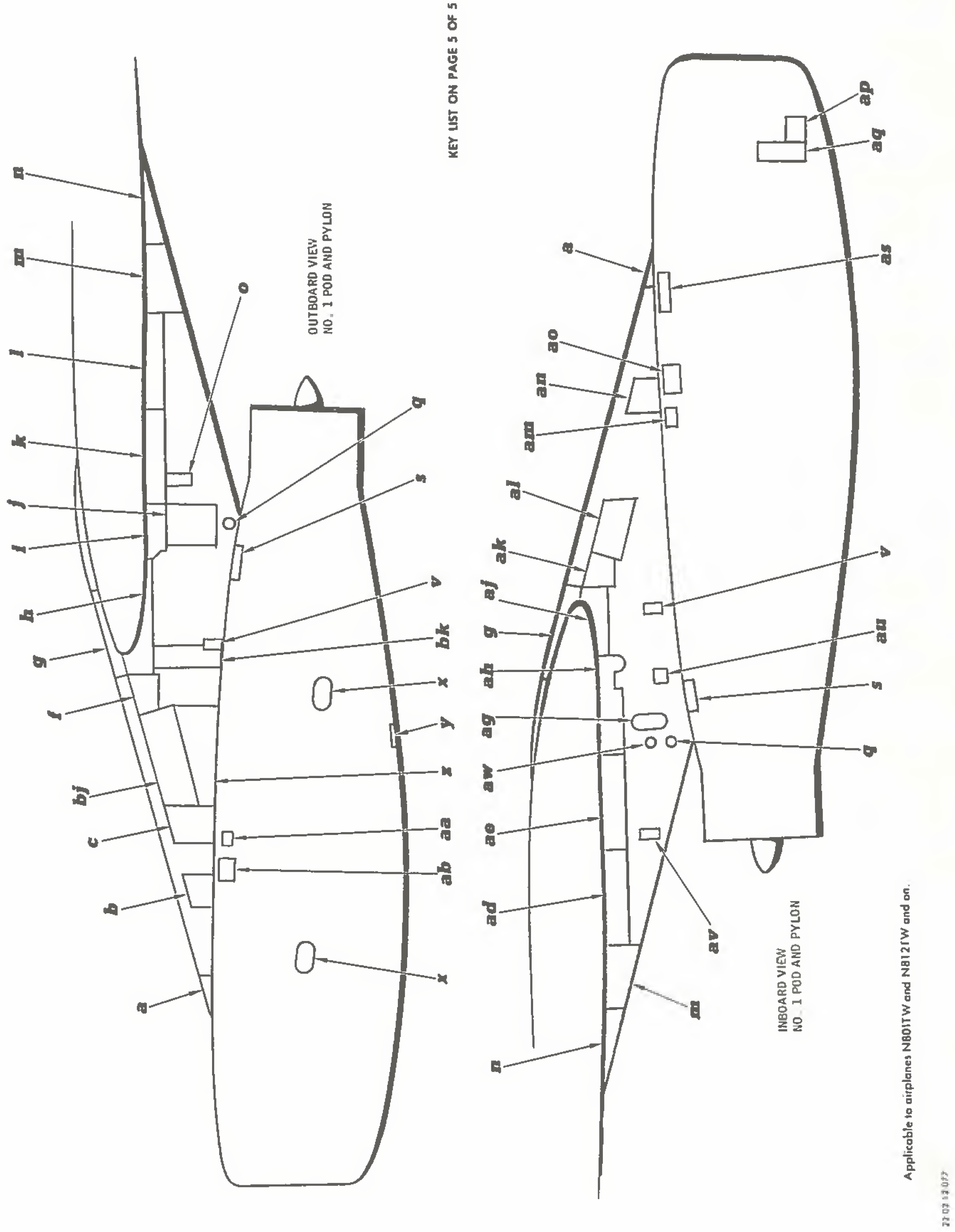


22.02.12.063

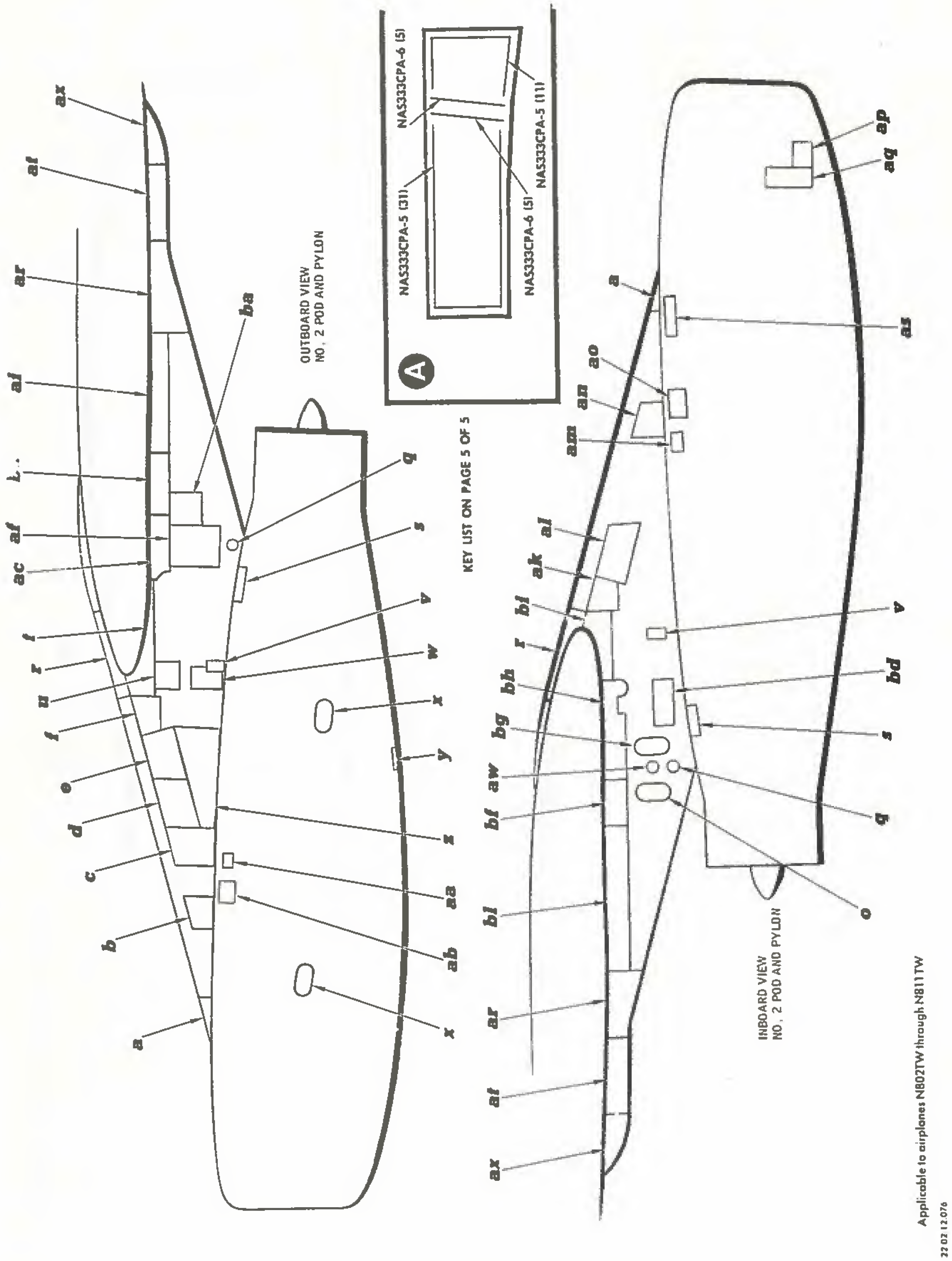
Wing to Fuselage Fairings
Figure 205



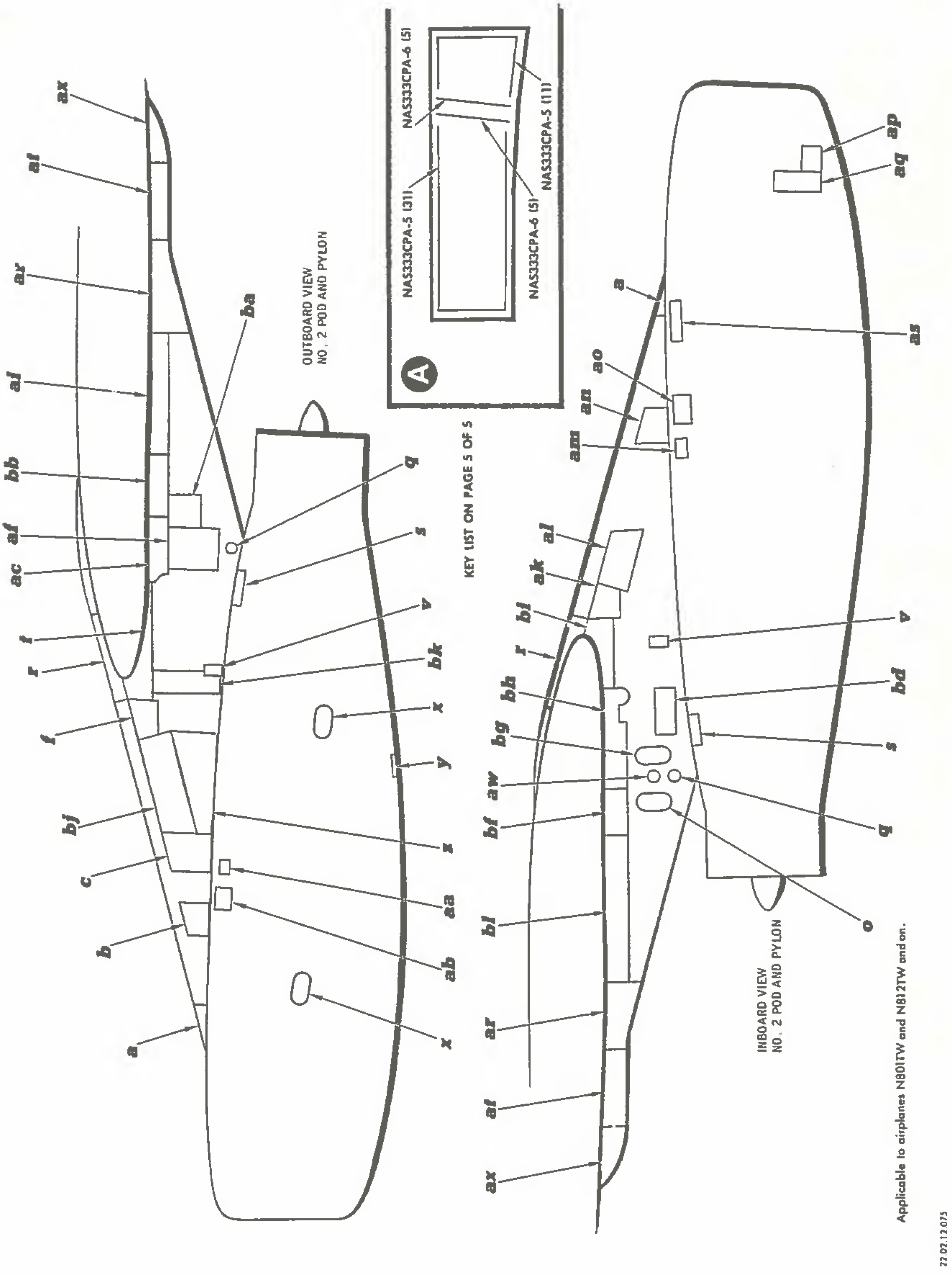
Engine Pod and Pylon Access Doors,
Panels and Fairings
Figure 206 (Sheet 1 of 7)



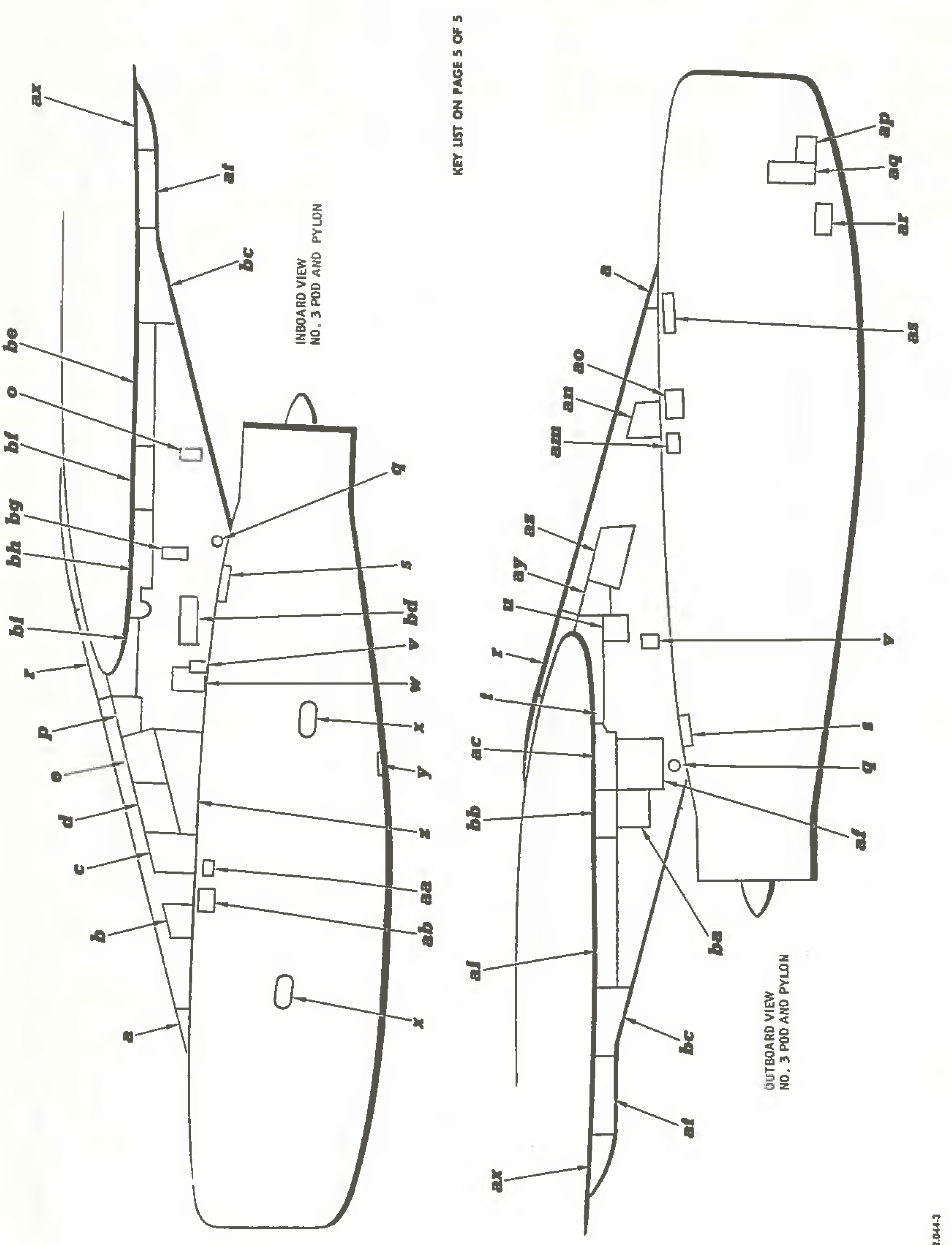
Engine Pod and Pylon Access Doors,
Panels and Fairings
Figure 206 (Sheet 2 of 7)



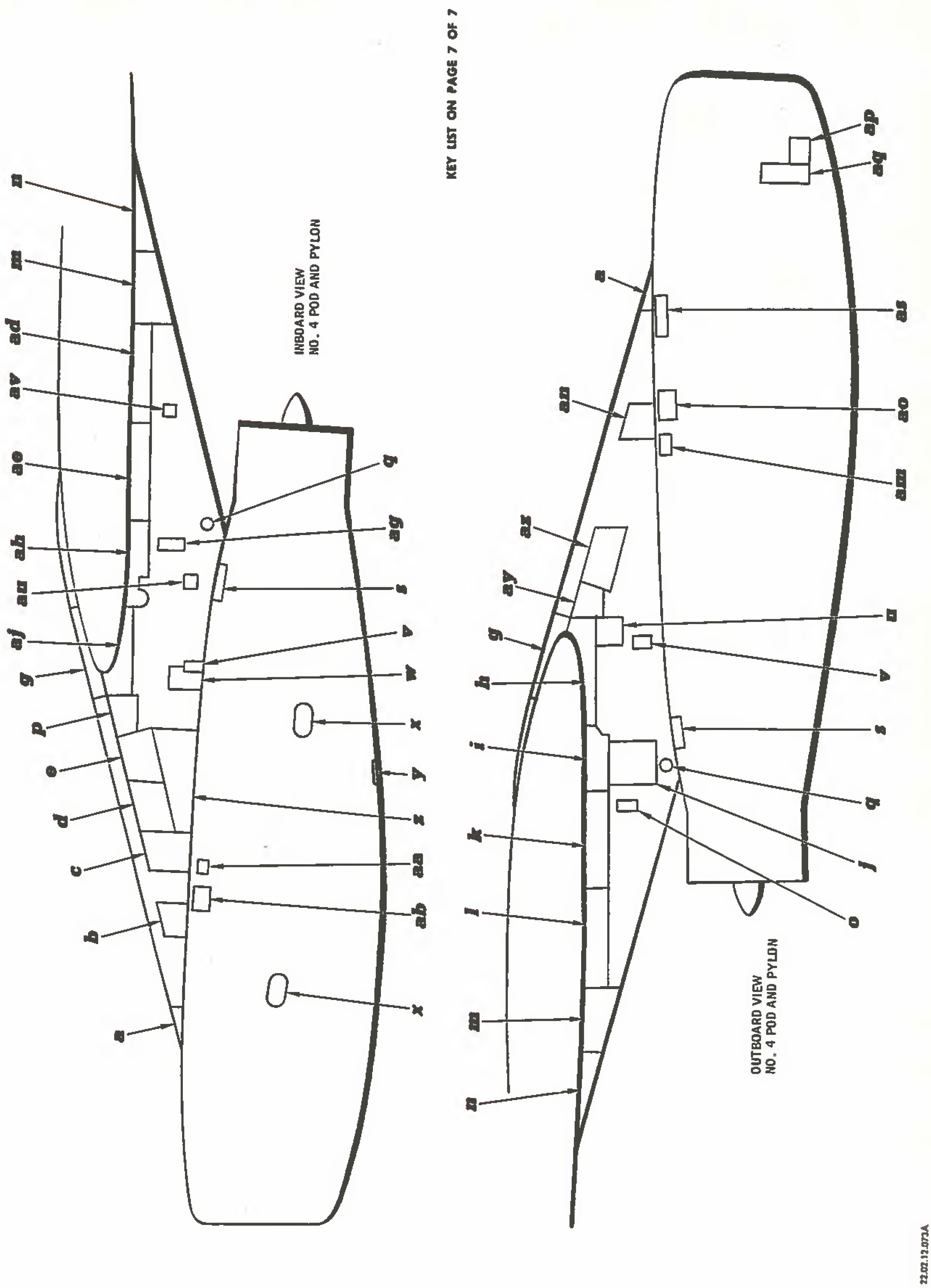
Engine Pod and Pylon Access Doors,
Panels and Fairings
Figure 206 (Sheet 3 of 7)



Engine Pod and Pylon Access Doors,
Panels and Fairings
Figure 206 (Sheet 4 of 7)



Engine Pod and Pylon Access Doors,
Panels and Fairings
Figure 206 (Sheet 5 of 7)



Engine Pod and Pylon Access Doors,
Panels and Fairings
Figure 206 (Sheet 6 of 7)

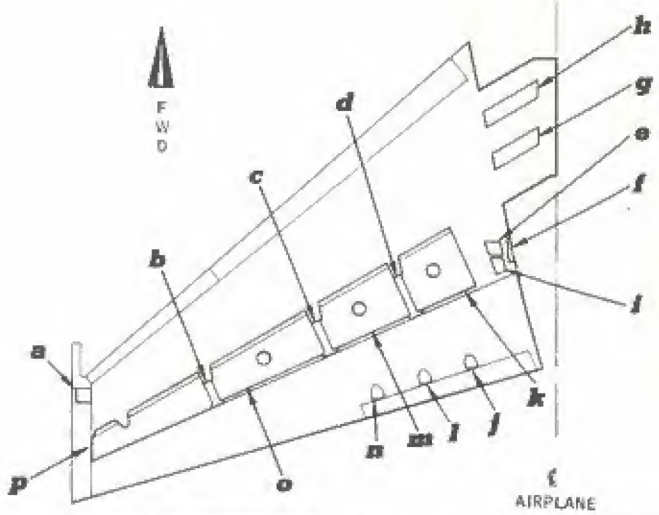
KEY ITEM	PART NAME and/or "STENCILLED NAME"	SEE DETAIL	STENCIL NUMBER of PART	FASTENER	TOTAL
a	PANEL		1	AN509C10R7	15
b	PANEL		33	AN509C10R7	20
c	PANEL		2	Quick-type	
d	PANEL		4	AN509C10R10	20
e	PANEL		21	AN509C10R10	19
f	PANEL		5	AN509C10R10	14
g	FAIRING			AN509-10R6	47
h	FAIRING			AN509-10R6	14
i	FAIRING			AN509-10R6	33
j	PANEL		8	AN509C10R11	26
k	FAIRING			AN509-10R6	35
l	FAIRING			AN509-10R6	36
m	FAIRING			AN509-10R6	55
n	FAIRING			AN509-10R6	36
o	PANEL		32	AN509C10R13	16
p	PANEL		5	AN509C10R10	15
q	DOOR		34, 35	Self-contained	
r	FAIRING			AN509-10R6	54
s	PANEL		19	Quick-type	
t	FAIRING			AN509-10R6	44
u	PANEL		6	AN509C10R10	11
v	PANEL		31	AN509-10	1
w	PANEL		7	AN509C10R10	18
x	DOOR		13	Spring-loaded	
y	DOOR		17	Quick-type	
z	PANEL		3	AN509C10R10	47
aa	PANEL		16	AN509C10R9	15
ab	PANEL		15	AN509C10R9	19
ac	FAIRING			AN509-10R6	27
ad	FAIRING			AN509-10R6	32
ae	FAIRING			AN509-10R6	31
af	PANEL		8	AN509C10R11	24
ag	PANEL		9	AN509C10R13	11
ah	FAIRING			AN509-10R6	38
ai	FAIRING			AN509-10R6	47
aj	FAIRING			AN509-10R6	16
ak	PANEL		5	AN509C10R10	15
al	PANEL		21	AN509-10R7	20
am	PANEL		30	AN509-10R9	15
an	PANEL		20	AN509-10R7	24
ao	PANEL		29	AN509C10R9	19
ap	PANEL		27	AN509-10R7	16
aq	PANEL		28	AN509-10R7	26
ar	DOOR		12	Quick-type	
				NAS221-8	4
as	DOOR		14	Quick-type	
at	FAIRING			AN509-10R6	31
au	PANEL		23	NAS333CPA-6	15
av	DOOR		22	Quick-type	
aw	DOOR		36	Self-contained	
ax	FAIRING			AN509-10R6	43
ay	PANEL		5	AN509C10R10	14
az	PANEL		21	AN509-10R7	21
ba	DOOR		11	Quick-type	
bb	FAIRING			AN509-10R6	22
bc	FAIRING			AN509-10R6	44
bd	PANEL	A	23	NAS333CPA-6	10
				-5	42
be	FAIRING			AN509-10R6	46
bf	FAIRING			AN509-10R6	21
bg	PANEL		9	AN509C10R13	12
bh	FAIRING			AN509-10R6	38
bi	FAIRING			AN509-10R6	26
bj	PANEL		49	AN509C10R10	37
bk	PANEL		48	AN509C10R10	31

22.02.12.044-38

Engine Pod and Pylon Access Doors,
Panels and Fairings
Figure 206 (Sheet 7 of 7)

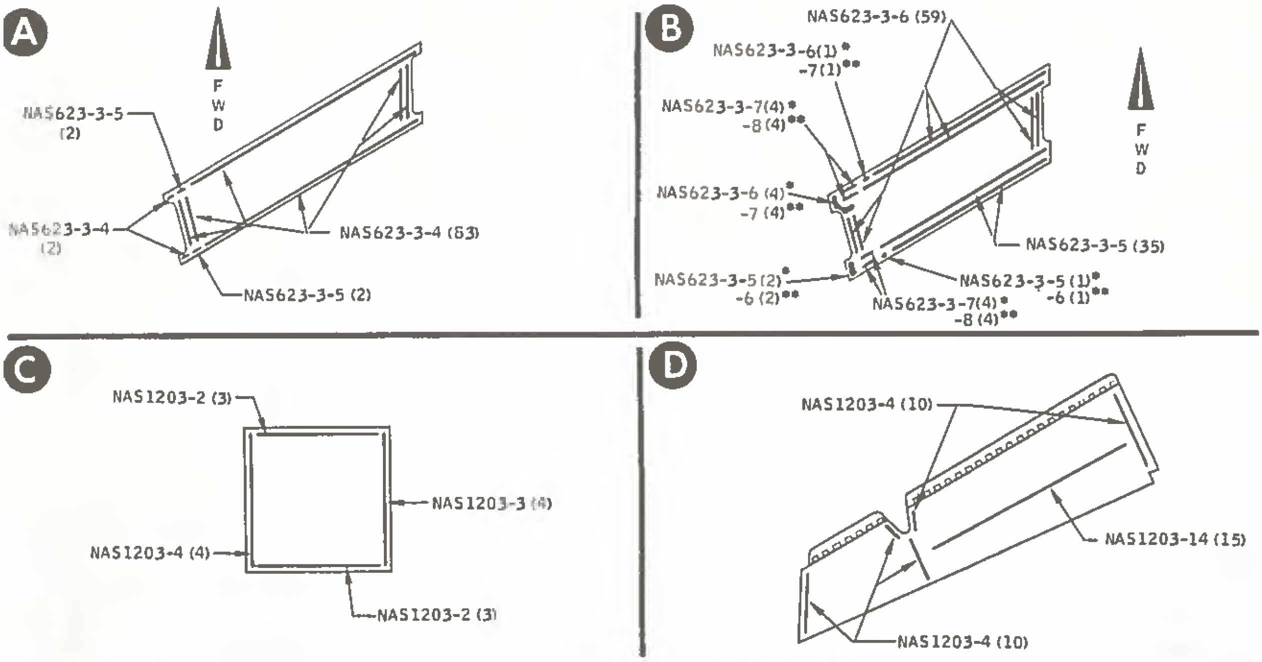
VIEW LOOKING DOWN
AT THE TOP SURFACE
(L.H. SIDE SHOWN)
(R.H. SIDE OPPOSITE)

*Applicable to airplanes N802TW through N816TW
**Applicable to airplanes N801TW and N817TW and on
Fasteners without * or ** applicable to all airplanes.



KEY ITEM	PART NAME and/or "STENCILLED NAME"	SEE DETAIL	STENCIL NUMBER of PART LH	CENTER	RH	FASTENER	TOTAL
a	PANEL	C	NONE		NONE	NAS1203-2 -3 -4	6 4 4
b	DOOR		P3		Q4	NAS1203-2	3
c	DOOR		L3		M4	NAS1203-2	6
d	DOOR		J3		K4	NAS1203-2	6
e	PANEL		105		106	NAS1203-3	24
f	PANEL		107		108	NAS1203-3	10
g	PANEL	B	103		104	NAS623-3-5 -5 -6 -6 -7 -7 -8	35 3* 62 2* 5 3* 8**
h	PANEL	A	101		102	NAS623-3-4 -5	85 4
i	PANEL		109		110	NAS1203-3	24
j	FAIRING		117		118	NAS1203-2	7
k	DOOR		A3		B4	NAS1203-4	30
l	FAIRING		119		120	NAS1203-2	7
m	DOOR		C3		D4	NAS1203-4	25
n	FAIRING		121		122	NAS1203-2	7
o	DOOR		E3		F4	NAS1203-4	22
p	DOOR	D	G3		H4	NAS1203-4 NAS1203-14	20 15
q	PANEL		25		26	NAS1203-3	12
r	PANEL		23		24	NAS1203-3	50
s	PANEL		21		22	NAS1203-3	26
t	PANEL		19		20	NAS1203-3	10
u	PANEL		17		18	NAS1203-3	27
v	PANEL		27		28	NAS1203-3	50
w	PANEL	F	7		8	NAS623-3-4 -6	12 80
x	PANEL	G	1		2	NAS623-3 -4 -5	50 6 11
y	PANEL	H	9		10	NAS1203-3 -4 -5	81 6 11
z	PANEL	I	3		4	NAS1203-3 -4 -5	94 6 11
aa	PANEL	K	5		6	NAS1203-3 -4 -5	80 17 5
ab	PANEL 22.02.12.031.1A	J	11		12	NAS1203-3 -4 -5	105 17 5

Horizontal Stabilizer,
Elevator and Trim Tab Access Doors and Panels
Figure 207 (Sheet 1 of 3)

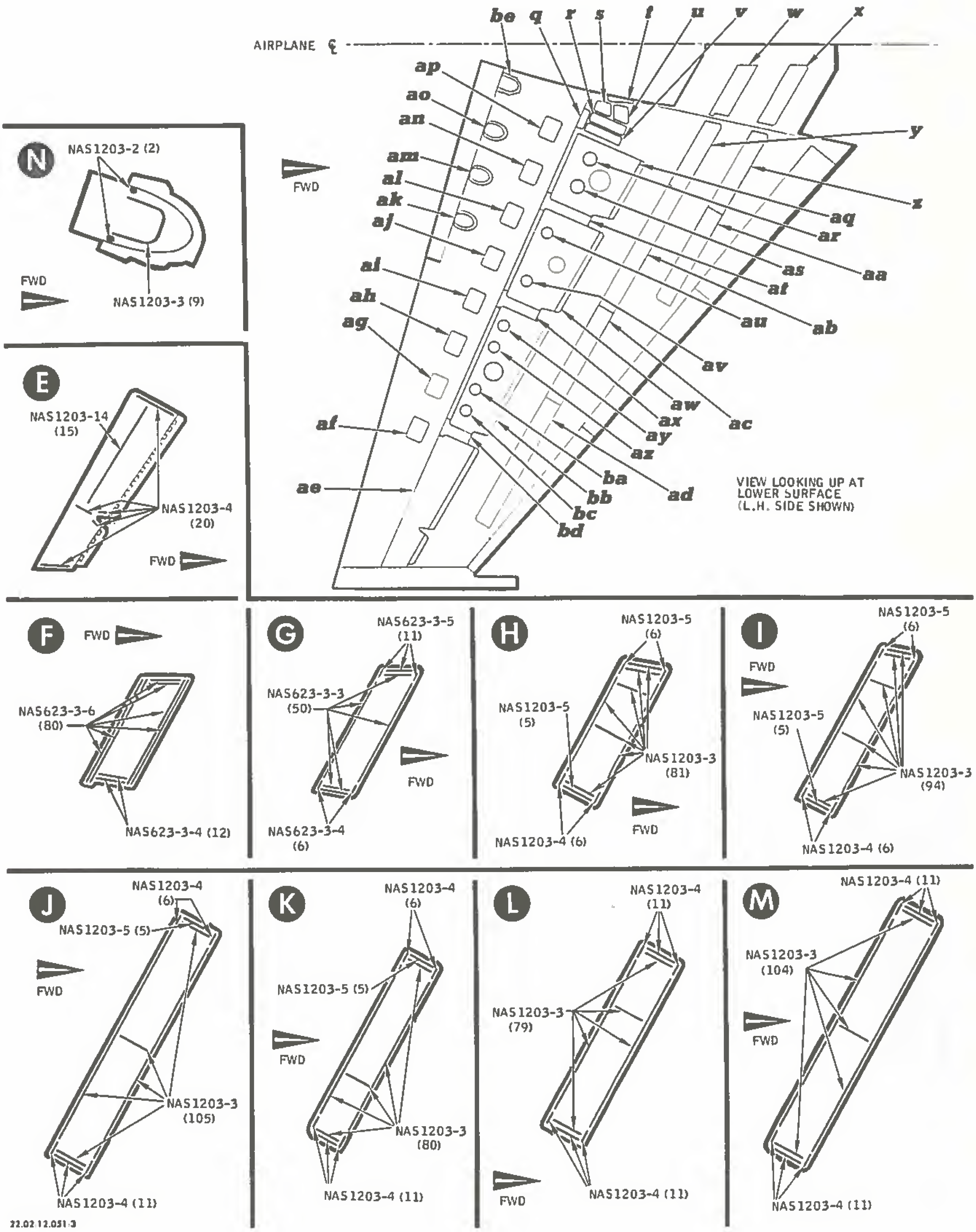


KEY ITEM	PART NAME and/or "STENCILLED NAME"	SEE DETAIL	STENCIL NUMBER of PART LH	CENTER	RH	FASTENER	TOTAL
ac	PANEL	L	13		14	NAS1203-3 -4	79 22
ad	PANEL	M	15		16	NAS1203-3 -4	104 22
ae	DOOR	E	G1		H2	NAS1203-4 -14	20 15
af	PANEL		65		66	NAS1203-2	26
ag	PANEL		63		64	NAS1203-2	26
ah	PANEL		61		62	NAS1203-2	26
ai	PANEL		59		60	NAS1203-2	26
aj	PANEL		57		58	NAS1203-2	26
ak	FAIRING		71		72	NAS1203-2	7
al	PANEL		55		56	NAS1203-2	26
am	FAIRING		69		70	NAS1203-2	7
an	PANEL		53		54	NAS1203-2	26
ao	FAIRING		67		68	NAS1203-2	7
ap	PANEL		51		52	NAS1203-2	26
aq	DOOR		A1		B2	NAS1203-4	30
ar	PANEL		29		30	NAS1203-2	4
as	PANEL		33		34	NAS1203-2	4
at	DOOR		J1		K2	NAS1203-2	6
au	PANEL		35		36	NAS1203-2	4
av	PANEL		39		40	NAS1203-2	4
aw	DOOR		C1		D2	NAS1203-4	25
ax	DOOR		L1		M2	NAS1203-2	6
ay	PANEL		41		42	NAS1203-2	4
az	PANEL		43		44	NAS1203-2	4
ba	PANEL		47		48	NAS1203-2	4
bb	DOOR		E1		F2	NAS1203-2	22
bc	PANEL		49		50	NAS1203-2	4
bd	DOOR		P1		Q2	NAS1203-2	3
be		N				NAS1203-3 -2	9 2

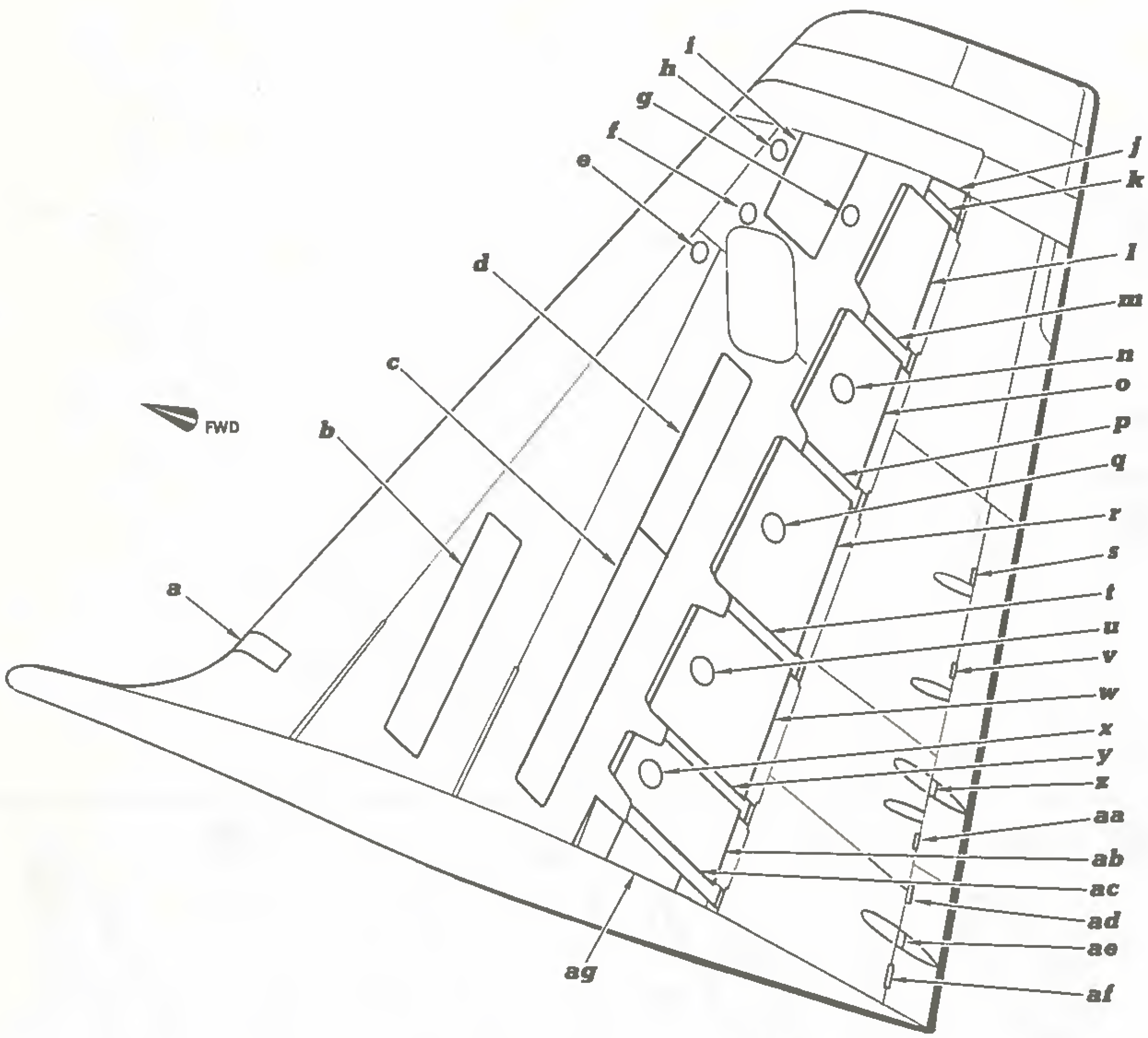
*Applicable to airplanes N802TW through N816TW
**Applicable to airplanes N801TW and N817TW and on
Fasteners without * or ** applicable to all airplanes.

22.02.12.051-2A

Horizontal Stabilizer,
Elevator and Trim Tab Access Doors and Panels
Figure 207 (Sheet 2 of 3)



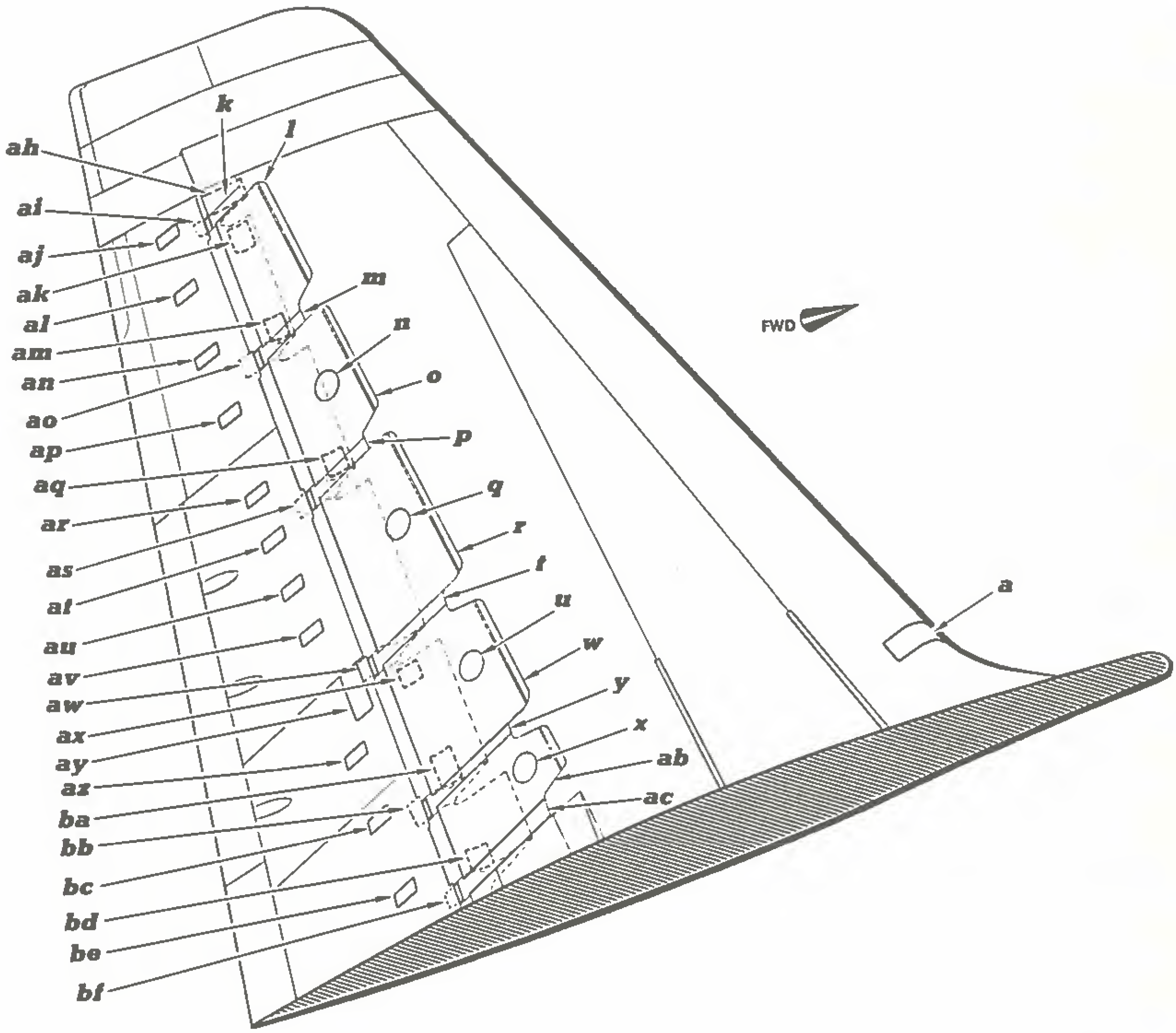
Horizontal Stabilizer,
Elevator and Trim Tab Access Doors and Panels
Figure 207 (Sheet 3 of 3)



KEY ITEM	PART NAME and/or "STENCILLED NAME"	SEE DETAIL	STENCIL NUMBER of PART LH	CENTER	RH	FASTENER	TOTAL
a	PANEL	N		171		NAS1203-2	18
						-3	28
b	PANEL	F	159			NAS1203-2	201
						-3	66
c	PANEL	K	155			NAS1203-2	258
						-3	46
d	PANEL	E	157			NAS1203-2	100
						-3	18
e	PANEL		167			NAS1203-3	10
f	PANEL		165			NAS1203-3	10
g	PANEL		161			NAS1203-3	10
h	PANEL		163			NAS1203-3	10
i	DOOR	G	Z5			NAS1203-4	2
						-3	35
j	PANEL	I	169		170	NAS1203-3	7
						-4	6
k	DOOR		A5		B6	NAS333PA5	9
l	DOOR	H	P5		Q6	NAS333PA4	12
						-5	6
m	DOOR		C5		D6	NAS333PA5	6
n	PANEL		153		154	NAS333PA4	8

22.02 12.049-1

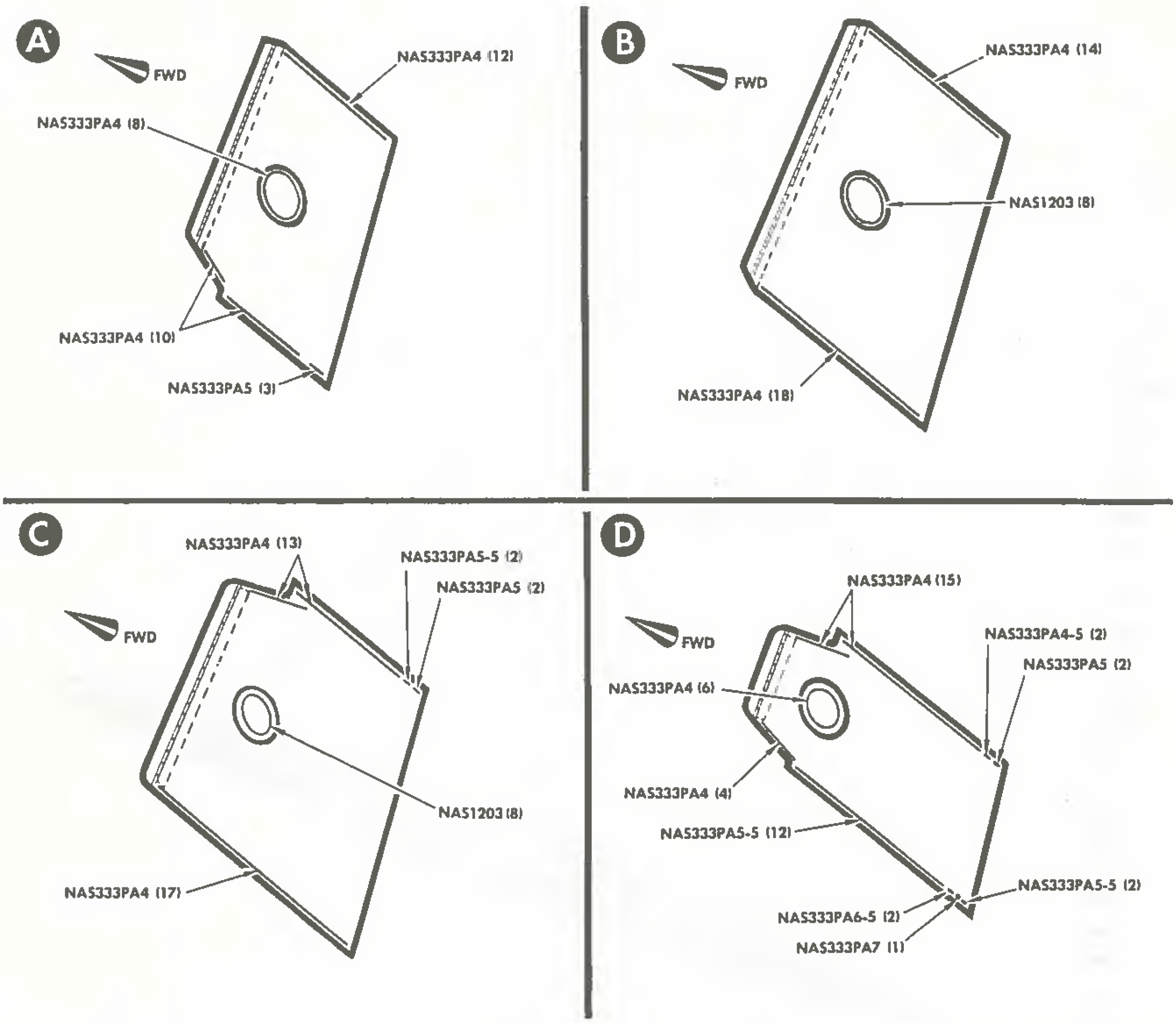
Vertical Stabilizer, Rudder, Trim Tab
and Flight Tab Access Doors and Panels
Figure 208 (Sheet 1 of 5)



KEY ITEM	PART NAME and/or "STENCILLED NAME"	SEE DETAIL	STENCIL NUMBER of PART LH	CENTER	RH	FASTENER	TOTAL
o	DOOR	A	R5		S6	NAS333PA4 NAS333PA5	22 3
p	DOOR		E5		F6	NAS333PA5	9
q	PANEL		151		152	NAS1203	8
r	DOOR	B	T5		U5	NAS333PA4	32
s	PANEL		139			NAS1203-1	4
t	DOOR		G5		H6	NAS333PA5	12
u	PANEL		149		150	NAS1203	8
v	PANEL		137			NAS1203-1	4
w	DOOR	C	V5		W6	NAS333PA4 NAS333PA5 -5	30 2 2
x	PANEL		147		148	NAS333PA4	6
y	PANEL		J5		K6	NAS333PA5	12
z	FAIRING	J	143			NAS1203-3 -1	3 2
aa	PANEL		135			NAS1203-1	7

22.02.12.049-2

Vertical Stabilizer, Rudder, Trim Tab
and Flight Tab Access Doors and Panels
Figure 208 (Sheet 2 of 5)



KEY ITEM	PART NAME and/or "STENCILLED NAME"	SEE DETAIL	STENCIL NUMBER of PART LH	CENTER	RH	FASTENER	TOTAL
ab	DOOR	D	X5		X6	NAS333PA4 -5 NAS333PA5 -5 NAS333PA6-5 NAS333PA7	19 2 2 14 2 1
ac	PANEL		L5		M6	NAS333PA6-5	41
ad	PANEL		133			NAS1203-1	4
ae	FAIRING		141			NAS1203-3	5
af	PANEL		131			NAS1203-1	4
ag	PANEL		145			NAS1203-3	34
ah	PANEL				195	NAS333PA4	13
ai	PANEL				193	NAS1203-1	6
aj	DOOR				221	NAS1203-2	2
ak	PANEL	M			183	NAS623-3-3 NAS333PA4	4 5
al	DOOR				219	NAS1203-2	2
am	PANEL	L			181	NAS623-3-3 NAS333PA4	3 5
an	DOOR				217	NAS1203-2	2
ao	PANEL				191	NAS1203-1	6

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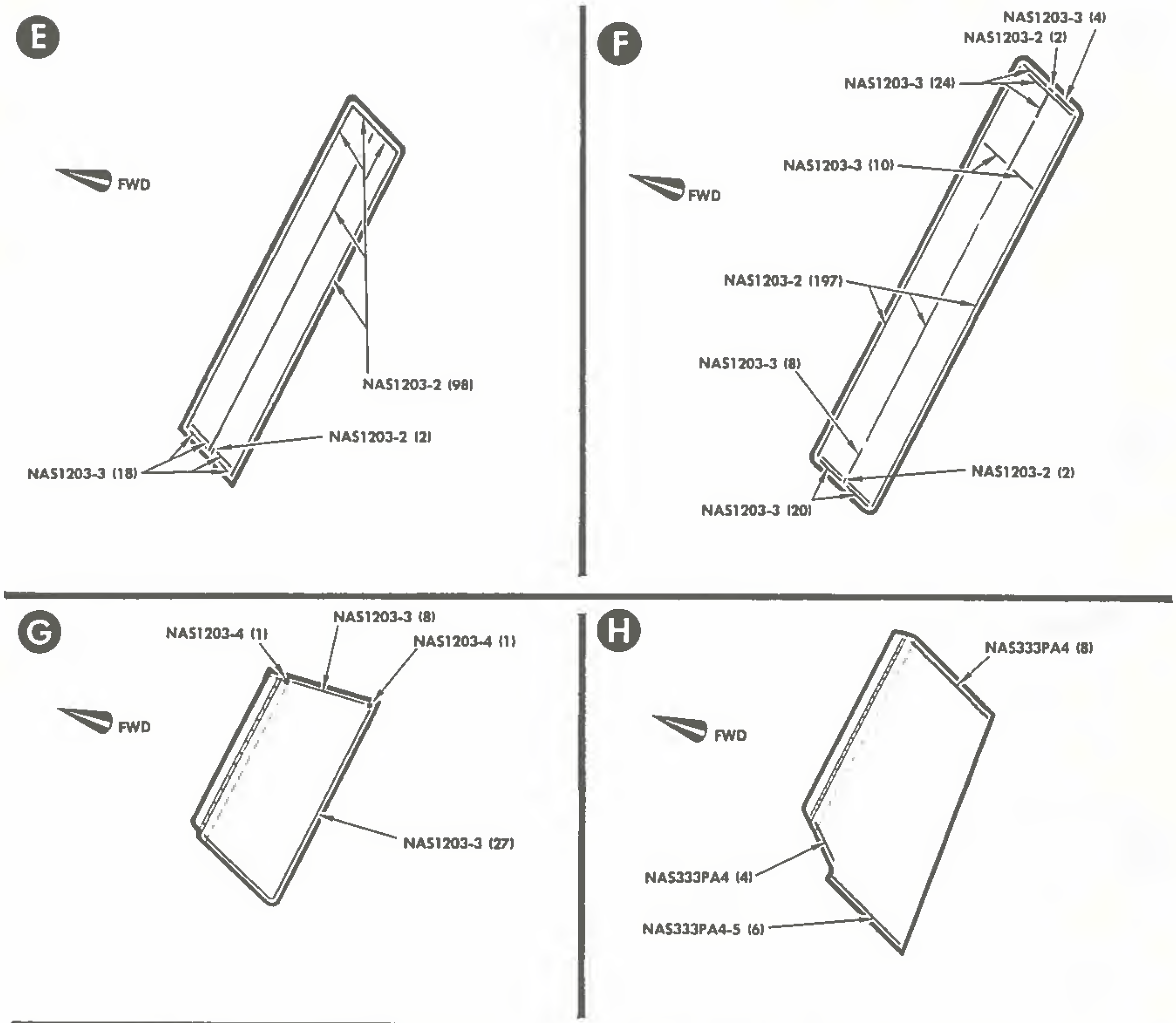
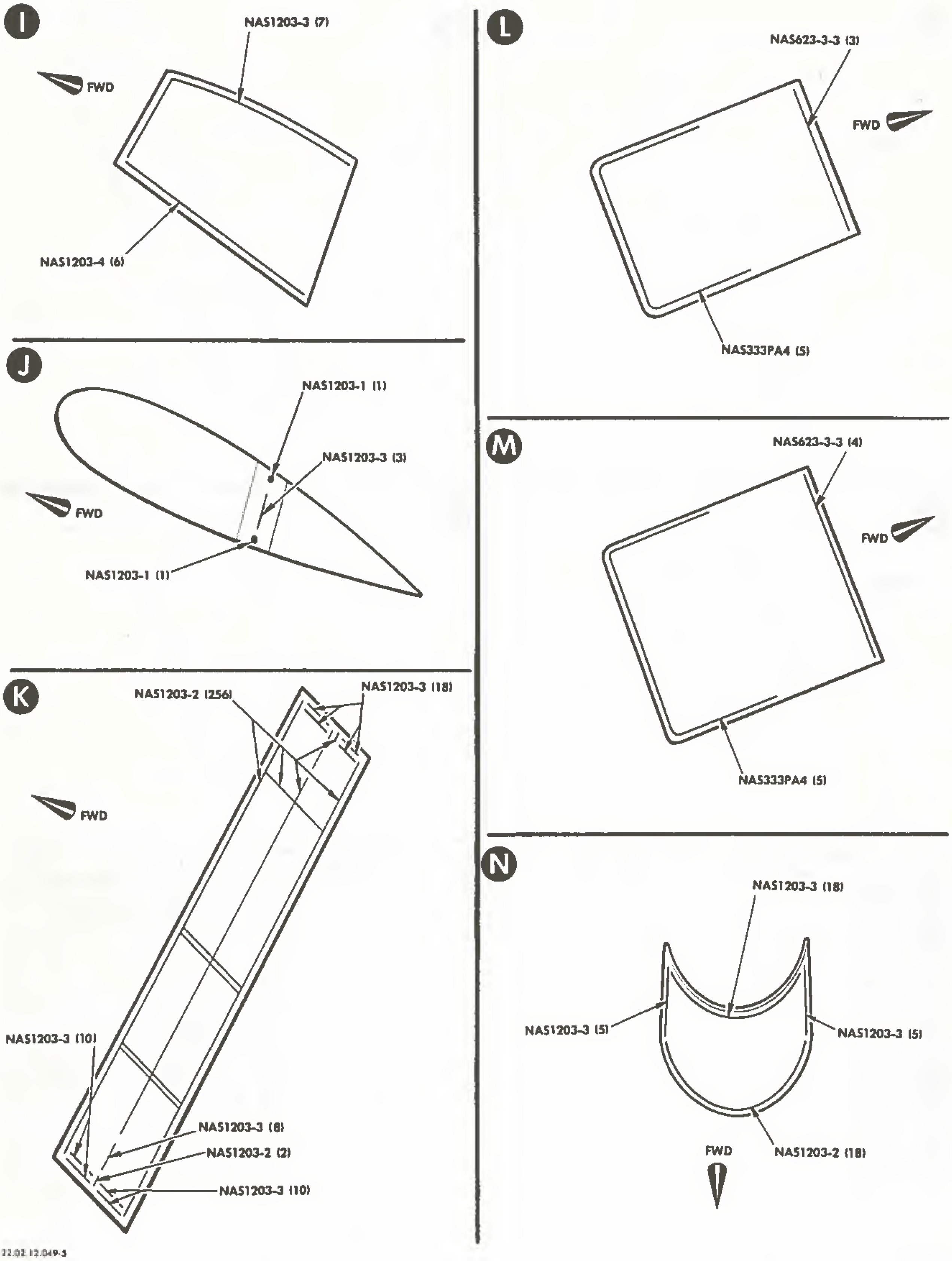
Vertical Stabilizer, Rudder, Trim Tab
and Flight Tab Access Doors and Panels
Figure 208 (Sheet 3 of 5)



KEY ITEM	PART NAME and/or "STENCILLED NAME"	SEE DETAIL	STENCIL NUMBER of PART LH	CENTER	RH	FASTENER	TOTAL
ap	DOOR				215	NAS1203-2	2
aq	PANEL				179	NAS333PA4	8
ar	DOOR				213	NAS1203-2	2
as	PANEL				189	NAS1203-1	6
at	DOOR				211	NAS1203-2	2
au	DOOR				209	NAS1203-2	2
av	DOOR				207	NAS1203-2	2
aw	PANEL				187	NAS1203-1	6
ax	PANEL				177	NAS333PA4	8
ay	PANEL				205	NAS1203-2	32
az	DOOR				203	NAS1203-2	2
ba	PANEL				175	NAS333PA4	14
bb	PANEL				185	NAS1203-1	6
bc	DOOR				201	NAS1203-2	2
bd	PANEL				173	NAS333PA4	8
be	DOOR				199	NAS1203-2	2
bf	PANEL				197	NAS1203-1	7

22.02.12.049-4

Vertical Stabilizer, Rudder, Trim Tab
and Flight Tab Access Doors and Panels
Figure 208 (Sheet 4 of 5)



Vertical Stabilizer, Rudder, Trim Tab
and Flight Tab Access Doors and Panels
Figure 208 (Sheet 5 of 5)

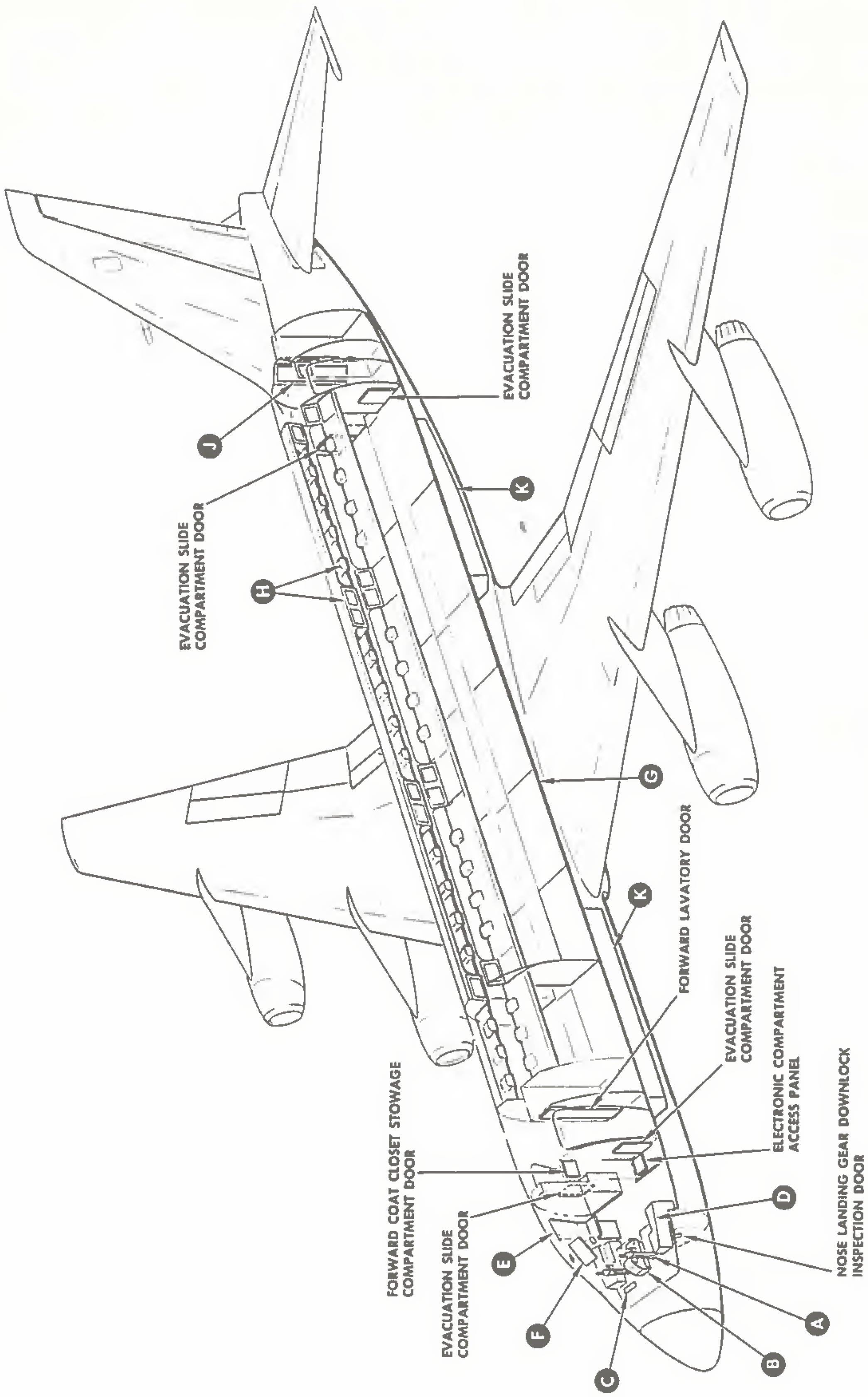
3. Fuselage Interior Access Doors and Panels (see Figure 209)

Throughout the interior of the airplane provisions are made for access to various areas and components for the purpose of maintenance, inspection, and stowage. The following list and illustrations provide nomenclature, location, and type of fasteners for the fuselage interior access doors and panels.

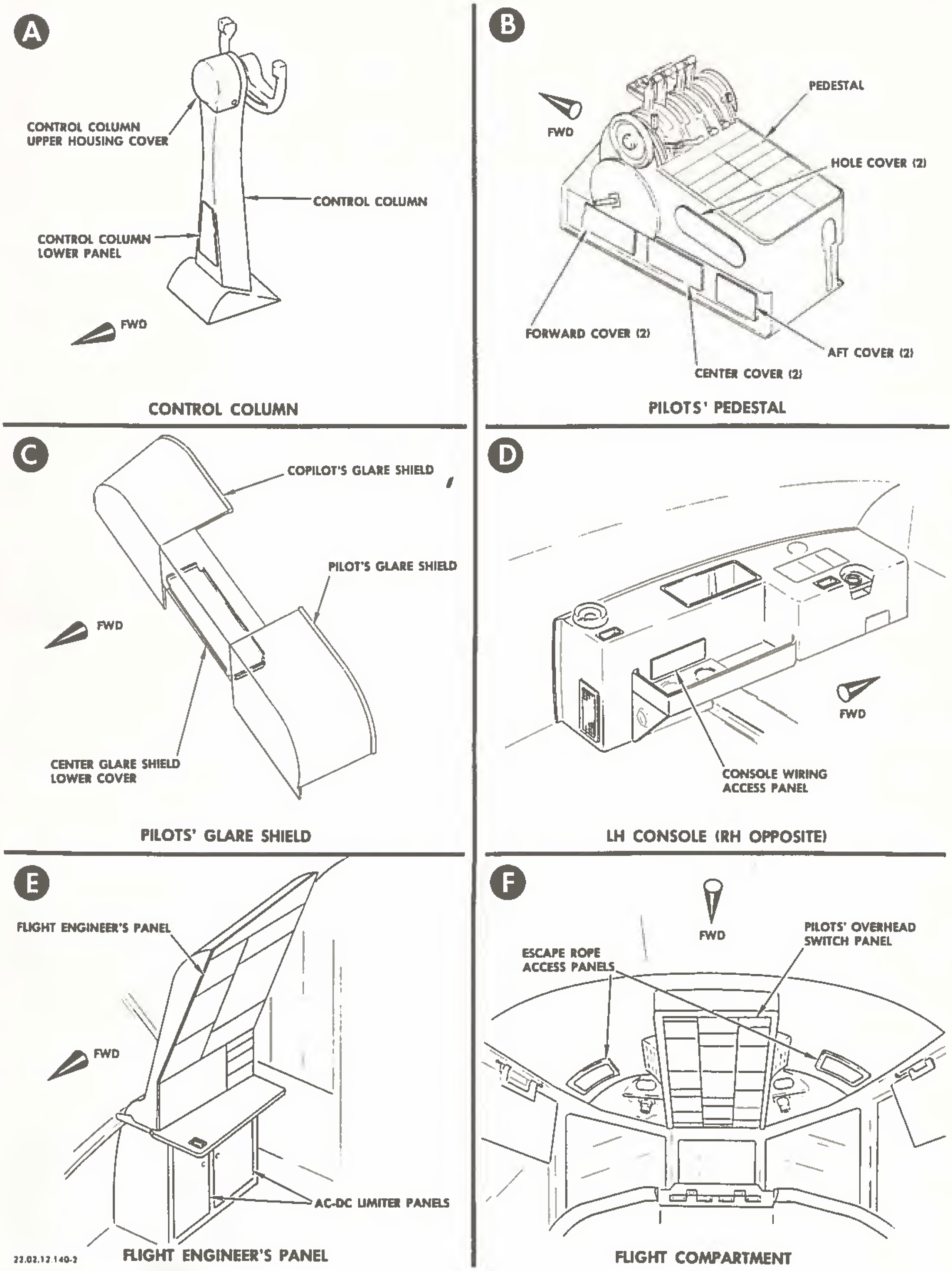
4. List of Fuselage Interior Access Doors and Panels

Nomenclature	Qty.	Location	Type Fasteners
Nose Landing Gear Downlock Inspection Door	1	Electrical and Electronic Compartment	Screw
Control Column Upper Housing Cover	2	Flight Compartment	Screw
Control Column Lower Panel	2	Flight Compartment	Screw
Pedestal Lower Forward Cover	2	Flight Compartment	Screw
Pedestal Lower Center Cover	2	Flight Compartment	Screw
Pedestal Lower Aft Cover	2	Flight Compartment	Screw
Pedestal Hole Cover	2	Flight Compartment	Screw
Center Glare Shield Lower Cover	2	Flight Compartment	Screw
Console Wiring Access Panel (Flight Kit Stowage Compartment)	2	Flight Compartment	Screw
Flight Engineer's Panels	2	Flight Compartment	Hinged
AC-DC Limiter Panels	2	Flight Compartment	Hinged
Pilots' Overhead Switch Panel	1	Flight Compartment	Screw

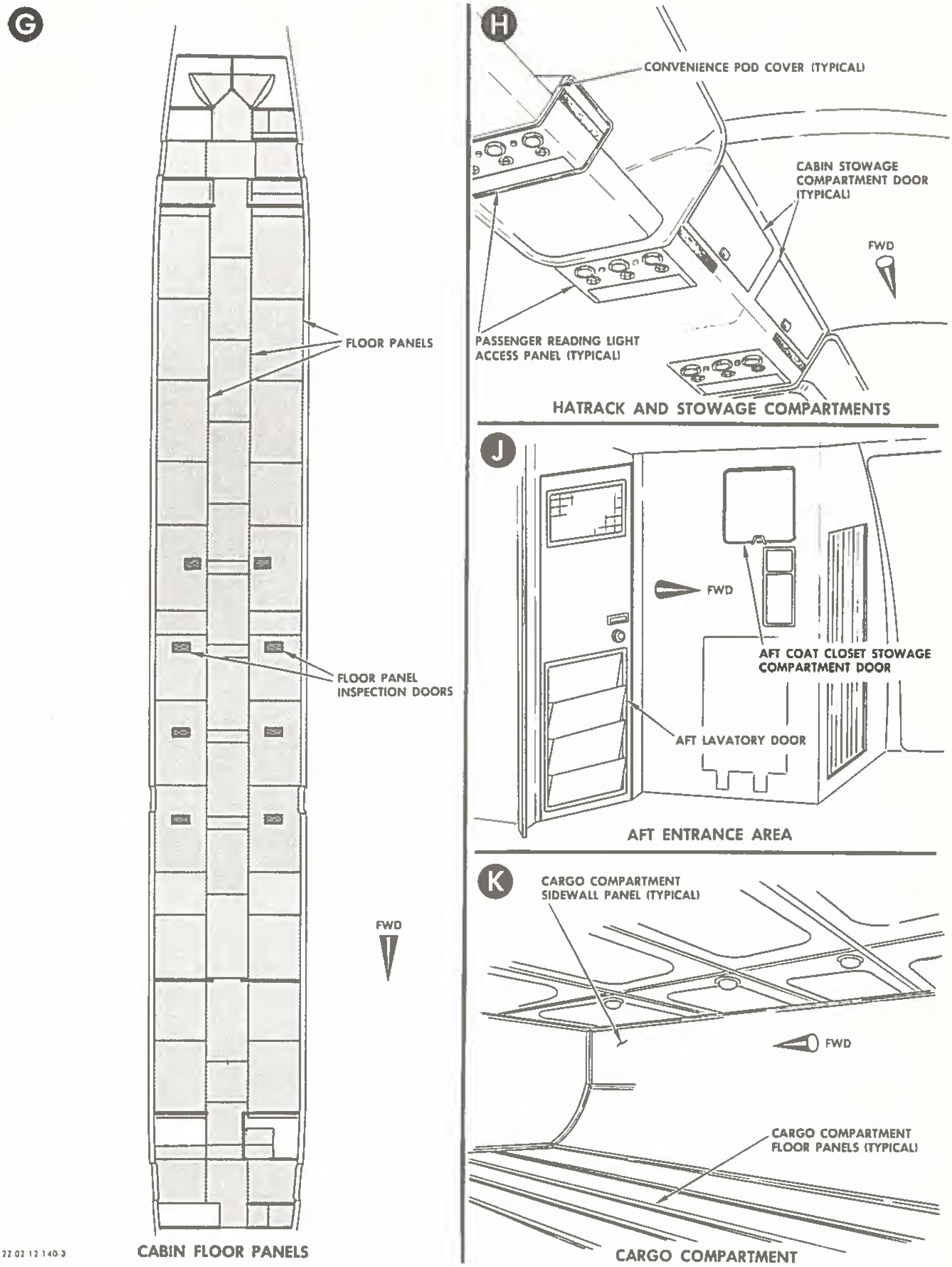
Nomenclature	Qty.	Location	Type Fasteners
Escape Rope Access Doors	2	Flight Compartment	Quick-type
Evacuation Slide Compartment Doors	2	Forward Entrance Area	Hinged
Forward Lavatory Door	1	Forward Entrance Area	Hinged
Forward Coat Closet Stowage Compartment	1	Forward Entrance Area Coat Closet	Hinged
Electronic Compartment Access Panel	1	Forward Entrance Area Coat Closet	Camlocks
Passenger Reading Light Access Panels	44	Cabin and Lounge	Screw
Convenience Pod Covers	44	Cabin and Lounge	Hinged
Cabin Stowage Compartment Doors	14	Cabin	Hinged
Floor Panels		Cabin	Screw
Floor Panel Inspection Doors	8	Cabin Floor Panels	Camlocks
Aft Lavatory Doors	2	Aft Entrance Area	Hinged
Aft Coat Closet Stowage Compartment	1	Aft Entrance., Area Coat Closet	Hinged
Evacuation Slide Compartment Doors	2	Aft Entrance Area	Hinged
Cargo Compartment Side Wall Panels		Cargo Compartments	Screw
Cargo Compartment Floor Panels		Cargo Compartments	Screw



Fuselage Interior Access Doors
and Panels
Figure 209 (Sheet 1 of 3)



Fuselage Interior Access Doors
and Panels
Figure 209 (Sheet 2 of 3)



Fuselage Interior Access Doors
and Panels
Figure 209 (Sheet 3 of 3)

LUBRICATION

1. Lubrication

A. General.

Lubrication methods shall conform to Specification MIL-L-6880. Lubrication procedures for unit assemblies are not included in this chapter. For "on assembly" lubrication of a particular component, refer to the component's applicable system chapter.

The following general practices shall be complied with during all lubrication processes. Figure 201 provides an explanation of the various codes and symbols used in this section.

(1) All surfaces which are to be lubricated shall be clean, and free from moisture, solvents or other agents.

(2) Lubricants shall not be applied over corrosion or rust.

(3) Use care when handling highly finished surfaces prior to lubrication. Corrosion can be initiated by body moisture and/or acids subsequent to the application of lubricant.

(4) Hinges, clevis pins, locking mechanisms and other low duty, low wear parts shall be lubricated lightly as required with oil, Specification MIL-L-7870, or "Lube Stick," whichever is more practical. Wipe surfaces clean and apply lubricant only to the actual working surfaces; remove excess lubricant from surrounding area.

NOTE: "Lube Stick" is preferred for lubricating openly exposed items such as door hinges, door tracks, latches and latch mechanisms where passengers or flight personnel are likely to brush against them.

(5) All pressure type grease fittings shall be wiped clean with a dry, lint free cloth prior to lubrication. Apply lubricant to pressure fittings until a small amount of lubricant is forced out of the unit being lubricated. Wipe excess lubricant from exposed surfaces and from around the unit to prevent sticky areas where dirt or foreign matter may collect and adhere to bearing surfaces.

(6) Use care when applying grease under pressure not to damage internal seals of the unit being lubricated, by forcing in too much grease.

(7) Do not oil anti-friction type bearings or subject them to steam or solvent sprays. Clean external surfaces of anti-friction bearings using a clean, lint free cloth dampened with solvent, Specification P-S-661.

B. Lubricants.

(1) Lubricants specified are for lubricating units which have a normal operating temperature range of from -65 degrees F (-54 degrees C) to +160 degrees F (72 degrees C).

(2) "Dry film" lubricated parts are surface treated and coated with a thermosetting, resin bonded dry powered lubricant (Molybdenum Disulphide) and do not normally require lubrication. However, in instances where the "dry film" coating has deteriorated or worn off a slight amount, the surface can be lubricated with a few drops of general purpose oil, Specification MIL-L-7870. In instances where damage or deterioration of the "dry film" coating is extensive, the part must be removed and re-treated with the baked-on "dry film" coating.

2. Lubricate Electrical-Electronic Equipment

A. General.

Various electrical and electronic components require periodic lubrication. Table I below lists the components, their lubrication interval, manufacturers name and part number. The list also provides the manufacturers maintenance manual or drawing number in which the lubrication instructions may be obtained for a particular component.

TABLE I

COMPONENT	LUBRICATION INTERVAL	MFG. PART NO.	MANUFACTURER AND LUBRICATION INFORMATION
VHF Radio Receiver	10,000 tubing cycles.	51X-2	Collins Radio Co. Maint. Manual dtd 7 Feb. 1958.
VHF Navigation Receiver	500 hours	51R-3	Collins Radio Co. Maint. Manual dtd 1 May 1957.
Radio Compass (ADF) Receiver	500 hours	51Y-3	Collins Radio Co. Maint. Manual dtd 1 May 1958.
Radio Power Control Panel	6 months	G-635	Gables Engineering Inc. Dwg. No. A-1072 dtd 25 May 1954.
Microphone Selector Control Panel (Pilots')	6 months	G-636	Gables Engineering Inc. Dwg. No. A-1072 dtd 25 May 1954.
Microphone Selector Control Panel (Flight Eng.)	6 months	G-637	Gables Engineering Inc. Dwg. No. A-1072 dtd 25 May 1954.

TABLE I (CONT)

COMPONENT	LUBRICATION INTERVAL	MFG. PART NO.	MANUFACTURER AND LUBRICATION INFORMATION
Weather Radar Control Panel	6 months	G-553	Gables Engineering Inc. Dwg. No. A-1072 dtd 25 May 1954.
Audio Selector Panel	6 months	G-551	Gables Engineering Inc. Dwg. No. A-1072 dtd 25 May 1954.
SELCAL Control Panel	6 months	G-556	Gables Engineering Inc. Dwg. No. A-1072 dtd 25 May 1954.
ATC Dual Transponder Control Panel	6 months	G-554V	Gables Engineering Inc. Dwg. No. A-1072 dtd 25 May 1954.
Weather Radar Receiver-Transmitter	5000 hours	AVQ-10	Radio Corp. of America Maint. Manual dtd 15 May 1957.
Weather Radar Antenna	5000 hours	AVQ-10	Radio Corp. of America Maint. Manual dtd 15 May 1957.
Weather Radar Accessory Unit	5000 hours	AVQ-10	Radio Corp. of America Maint. Manual dtd 15 May 1957.
Radio Compass (ADF) Control Panel	One year	614L-5	Collins Radio Co. Maint. Manual dtd 1 March 1958.

3. Lubrication Illustrations

TABLE II

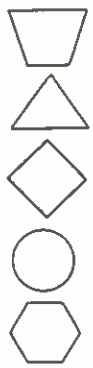
ILLUSTRATION	FIGURE NUMBER
Lubrication Data	201
Nose Radome Support Linkage Lubrication	202
Main Entrance Door Hinge, Hold-Open Device, Slide Tube and Door Lift Cable Lubrication	203
Service Door Hinge, Hold-Open Device, Slide Tube and Door Lift Cable Lubrication	204
Forward and Aft Cargo Compartment Zipper Panels Lubrication	205
Nose Landing Gear Lubrication	206
Nose Landing Gear Uplock Lubrication	207
Nose Landing Gear Door Mechanism Lubrication	208

TABLE II (CONT)

TABLE OF LUBRICANTS

SYMBOL	SPECIFICATION	IDENTIFICATION
— — —	MIL-G-7421	GREASE, EXTREME LOW TEMPERATURE
OGP	MIL-L-7870	LUBRICATING OIL, GENERAL PURPOSE, LOW TEMPERATURE
OGR	MIL-L-6086	LUBRICATING OIL, GEAR, PETROLEUM BASE, GRADE L
GH	MIL-L-3545	LUBRICATING GREASE, HIGH TEMPERATURE
GSG	MIL-G-7118	GREASE, AIRCRAFT GEAR AND ACTUATOR SCREW, LOW AND HIGH TEMPERATURE
GB	MIL-L-7711	GREASE, AIRCRAFT, GENERAL PURPOSE
GG	MIL-G-7187	GREASE, GRAPHITE, AIRCRAFT LUBRICATING
OHA	MIL-H-5606	OIL, HYDRAULIC, AIRCRAFT, PETROLEUM BASE
CIS	MIL-I-8660	INSULATION AND SEALING COMPOUND, ELECTRICAL (DC-4)
M77		MOLYKOTE LUBRICANT TYPE M-77
ELO	MIL-L-7808	OIL, ENGINE

FREQUENCY SYMBOL
EXPRESSED IN FLIGHT HOURS



100 HOURS

250 HOURS

500 HOURS

1000 HOURS

ON CONDITION

APPLICATION SYMBOL

GREASE GUN

OIL CAN

HAND

BRUSH

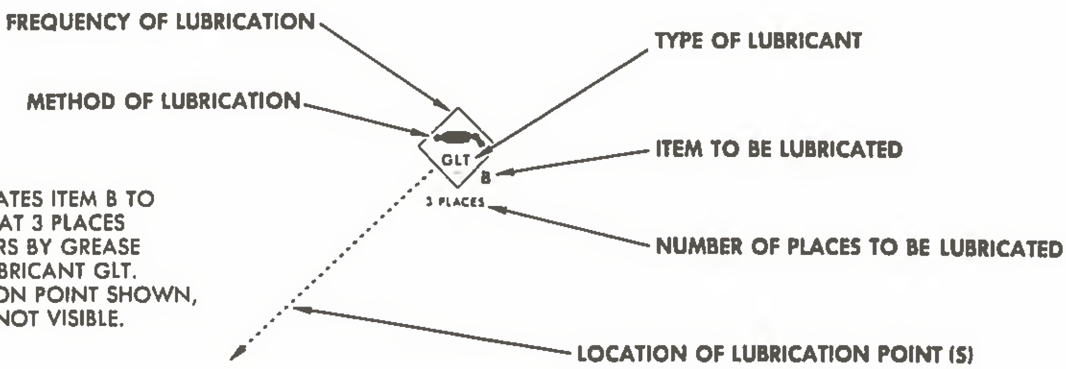
LOCATION SYMBOL

SOLID LINE WITH ARROWHEAD— INDICATES SPECIFIC LUBRICATION POINT.

BROKEN LINE WITH ARROWHEAD— INDICATES SPECIFIC LUBRICATION POINT AND IDENTICAL POINT OR POINTS NOT SHOWN.

BROKEN LINE WITHOUT ARROWHEAD— INDICATES GENERAL LOCATION OF LUBRICATION POINT OR POINTS.

EXAMPLE OF CODING



NOTE

EXAMPLE INDICATES ITEM B TO BE LUBRICATED AT 3 PLACES EVERY 500 HOURS BY GREASE GUN, USING LUBRICANT GLT. ONE LUBRICATION POINT SHOWN, OTHER POINTS NOT VISIBLE.

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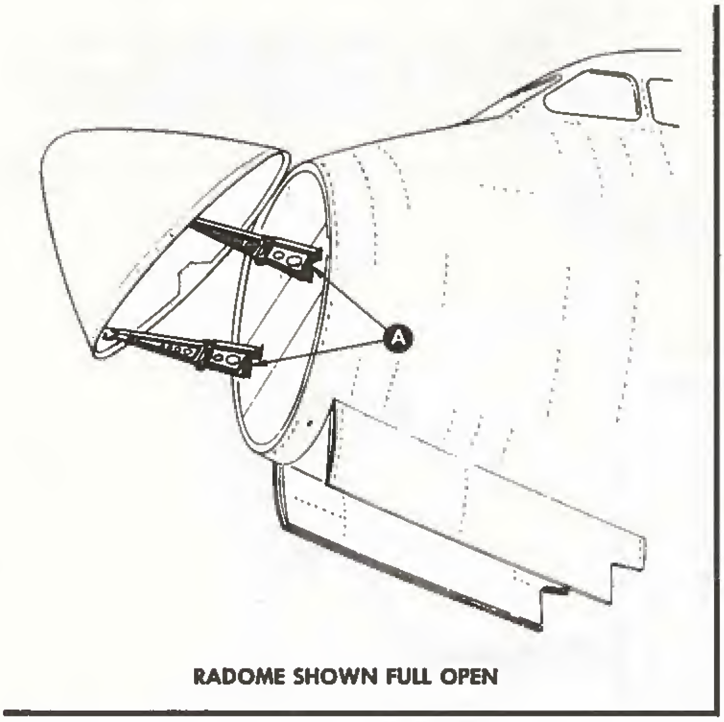
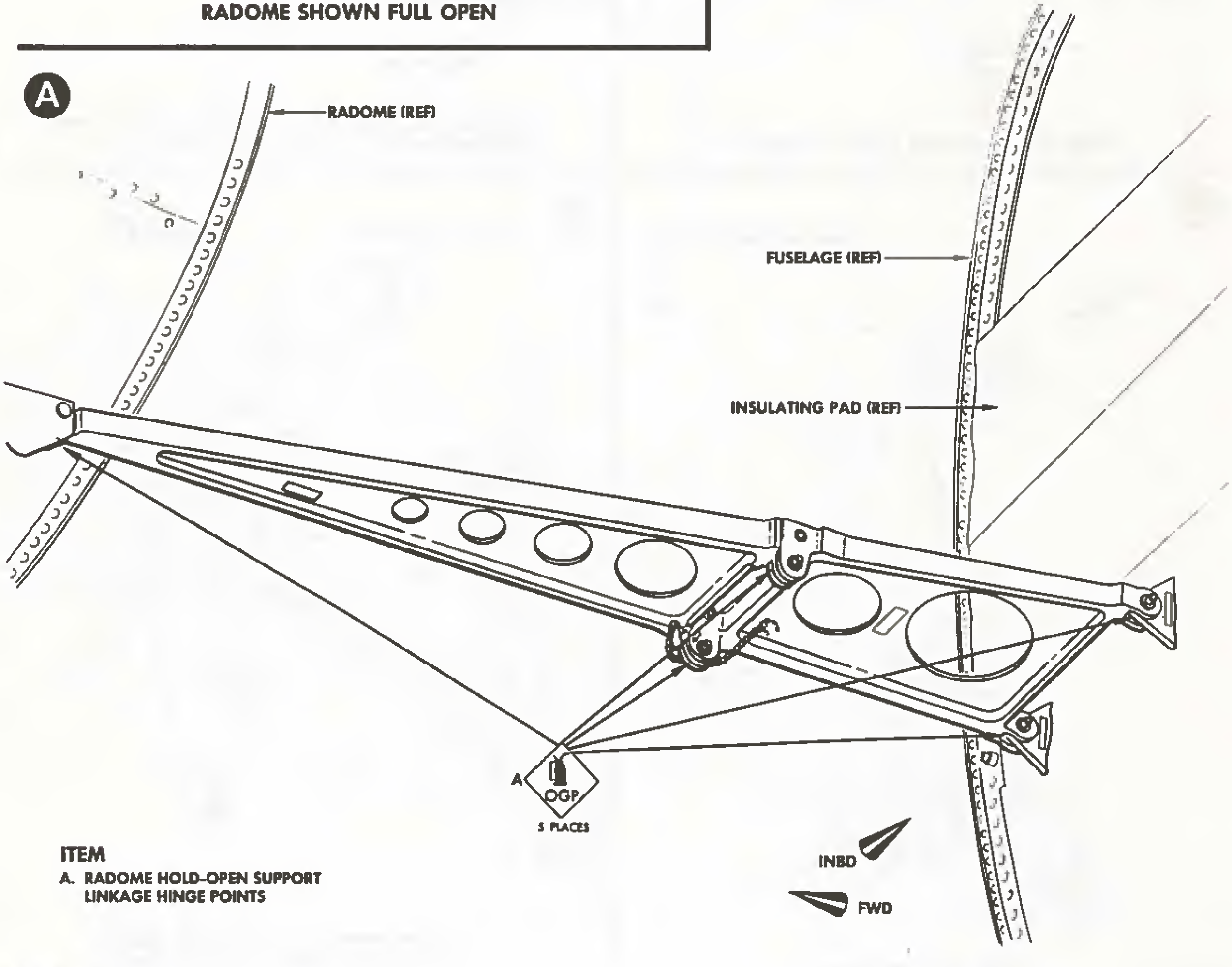
Lubrication Data
Figure 201



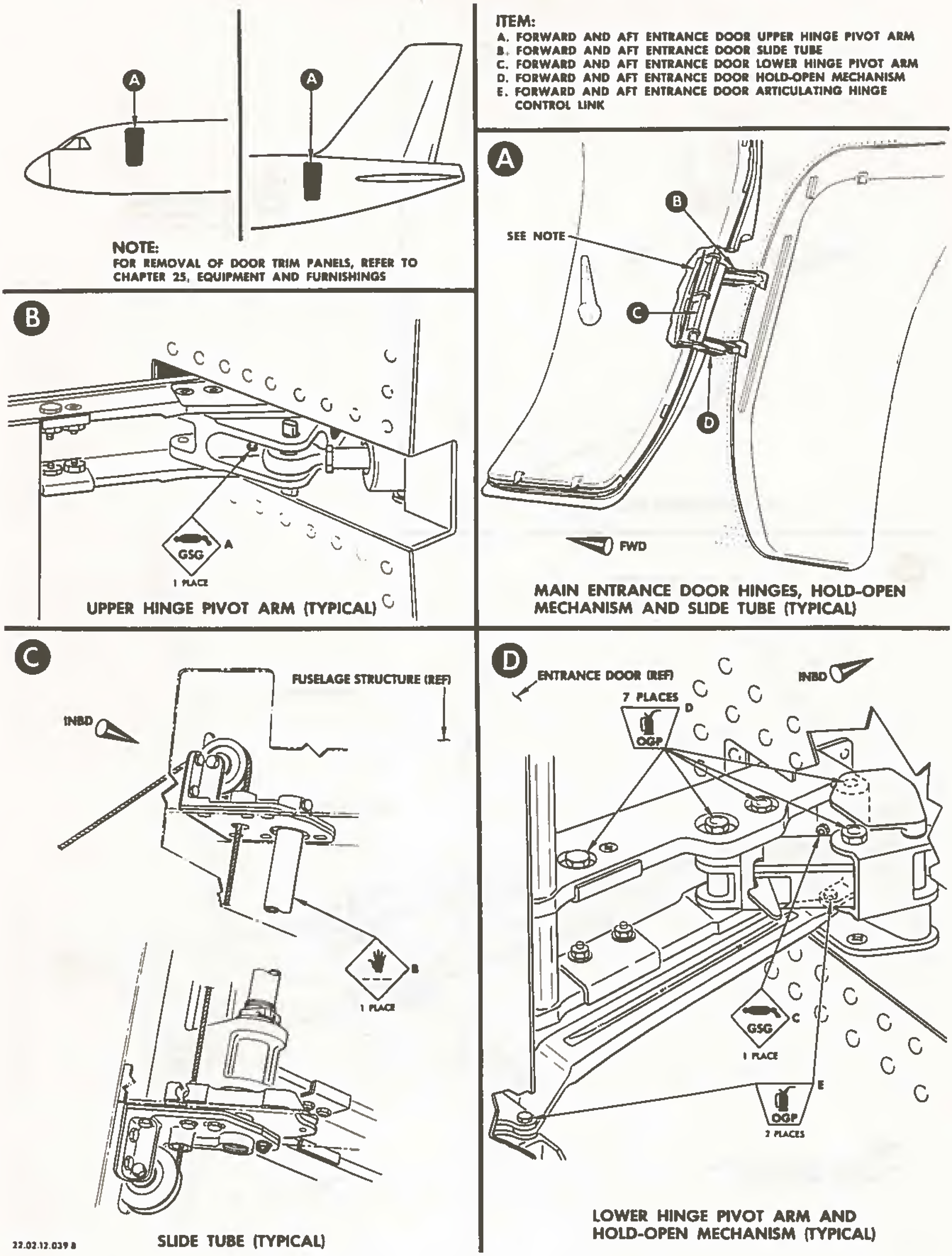
NOTE:
RIGHT-HAND SIDE LINKAGE SHOWN—LEFT-HAND SIDE LINKAGE IDENTICAL.



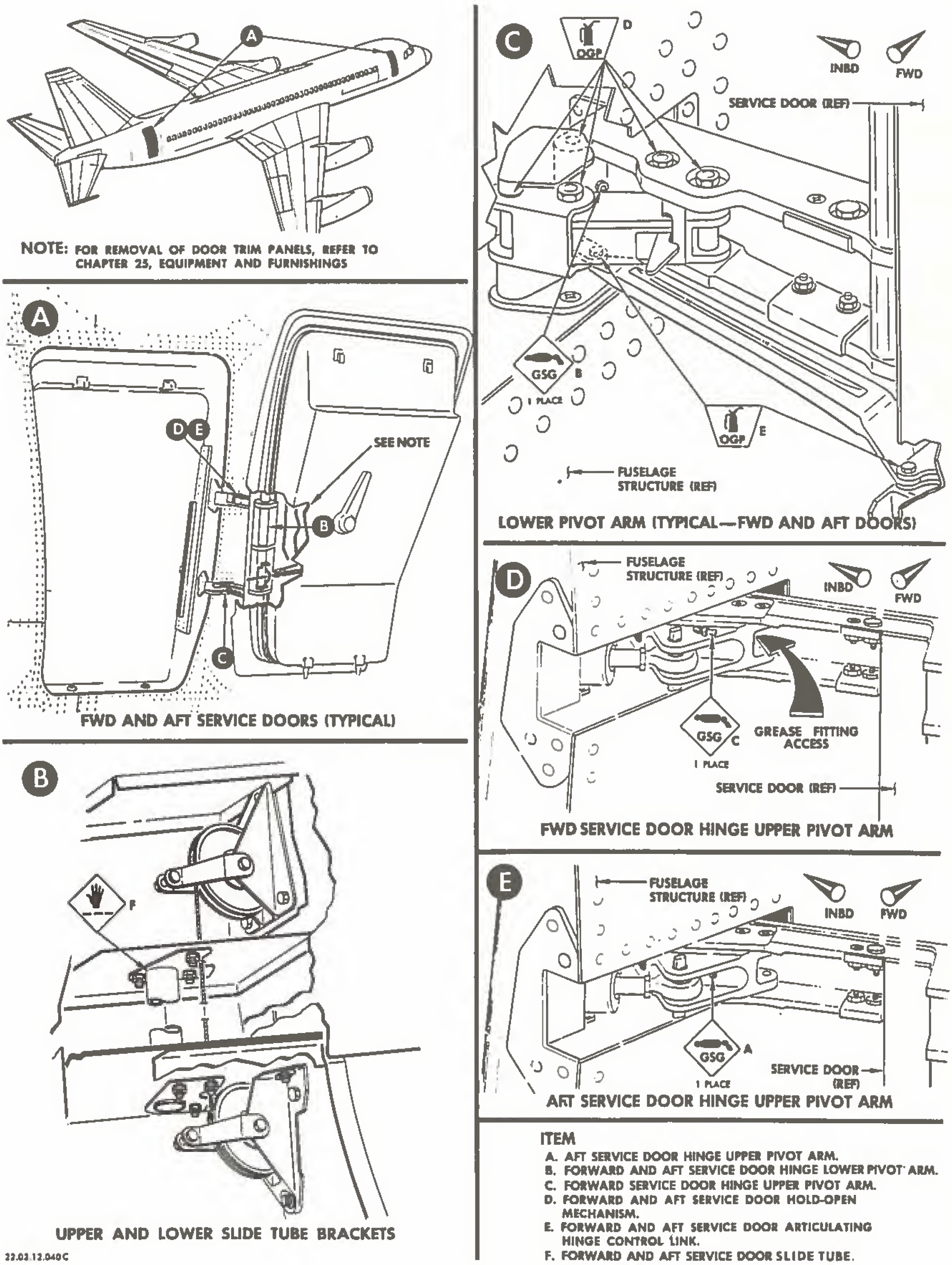
ITEM
A. RADOME HOLD-OPEN SUPPORT LINKAGE HINGE POINTS

72.02.12.038

Nose Radome Support Linkage Lubrication
Figure 202

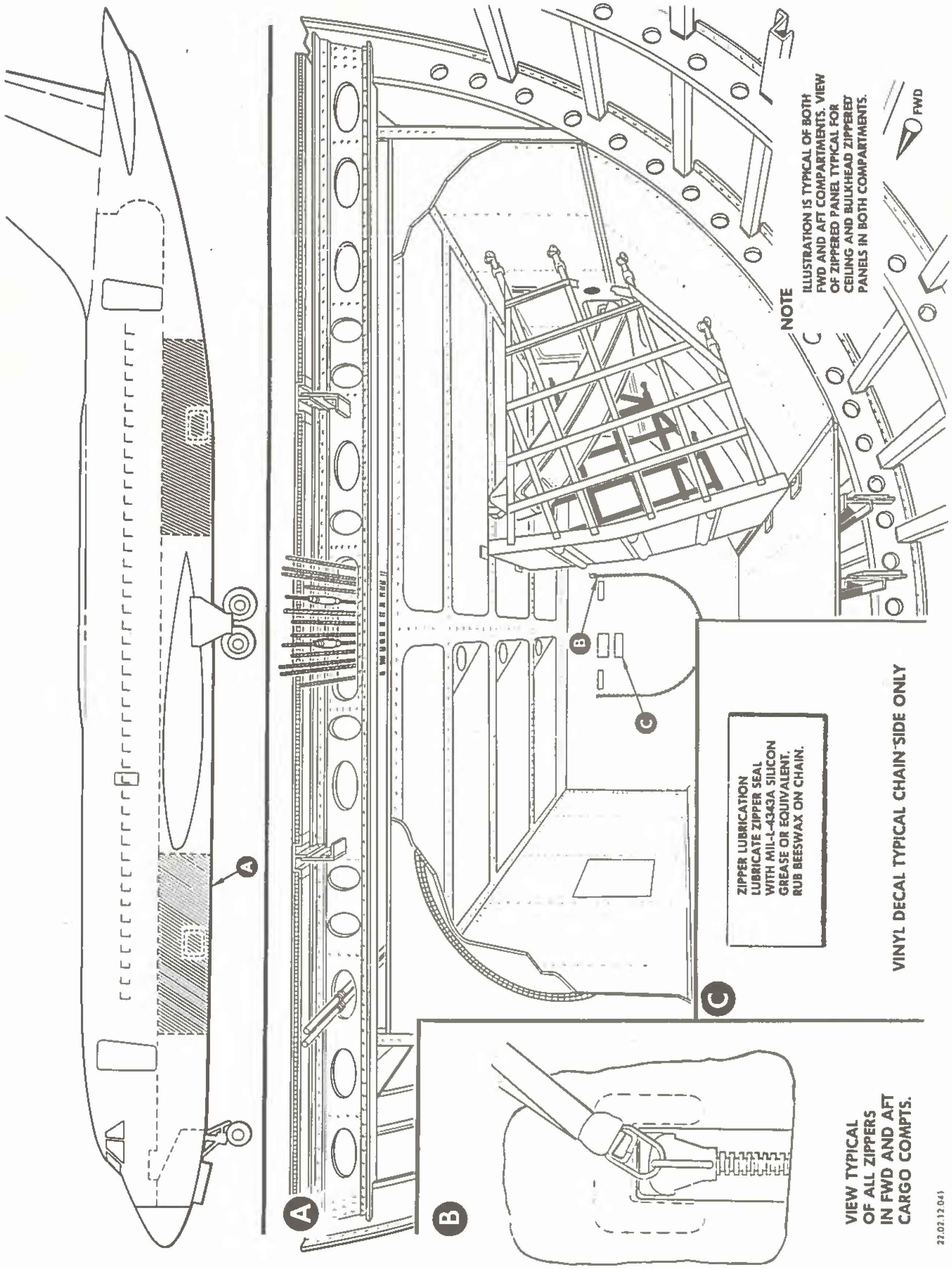


Main Entrance Door Hinge, Hold-Open
Device and Slide Tube Lubrication
Figure 203

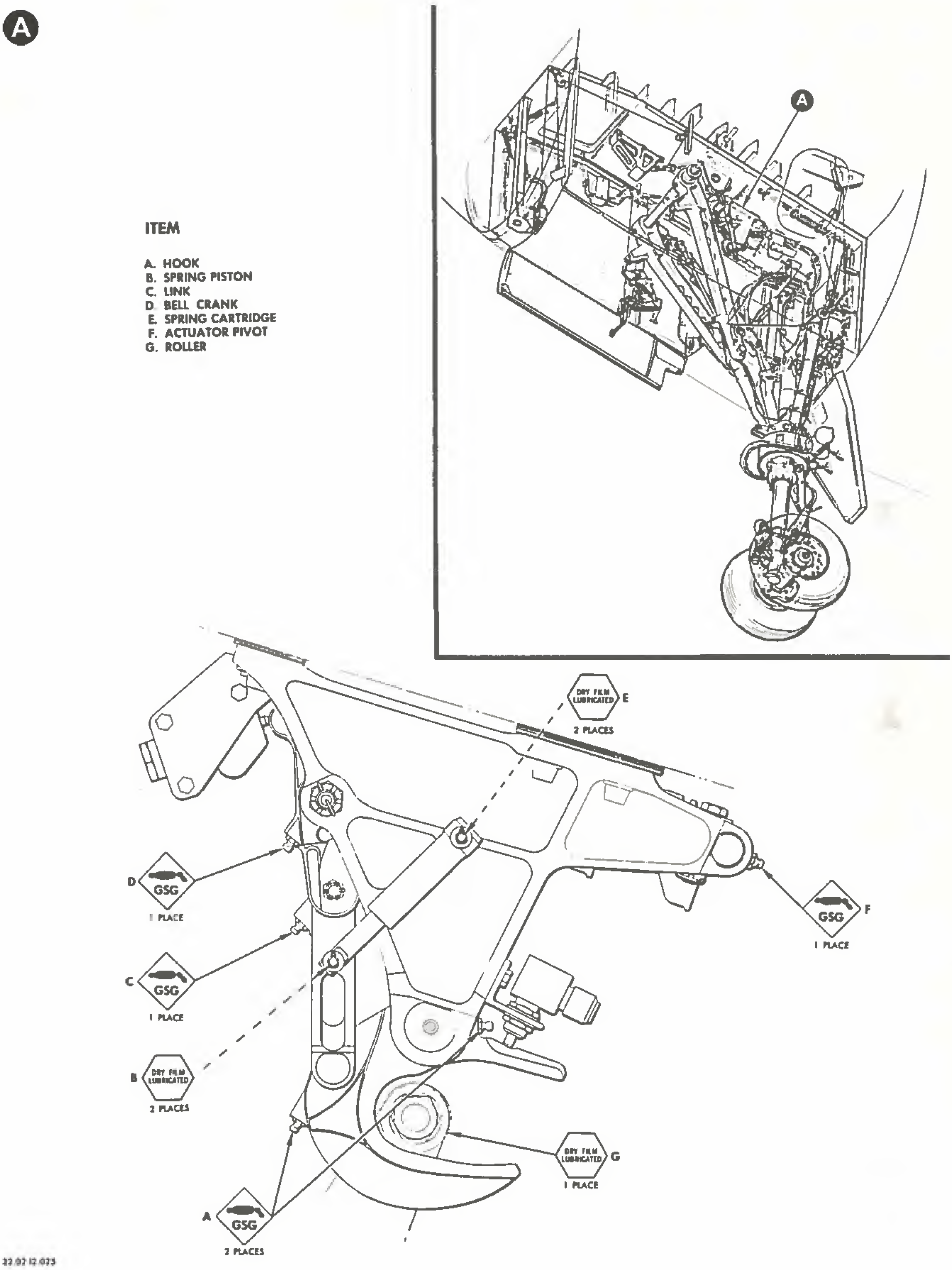


ITEM
A. AFT SERVICE DOOR HINGE UPPER PIVOT ARM.
B. FORWARD AND AFT SERVICE DOOR HINGE LOWER PIVOT ARM.
C. FORWARD SERVICE DOOR HINGE UPPER PIVOT ARM.
D. FORWARD AND AFT SERVICE DOOR HOLD-OPEN MECHANISM.
E. FORWARD AND AFT SERVICE DOOR ARTICULATING HINGE CONTROL LINK.
F. FORWARD AND AFT SERVICE DOOR SLIDE TUBE.

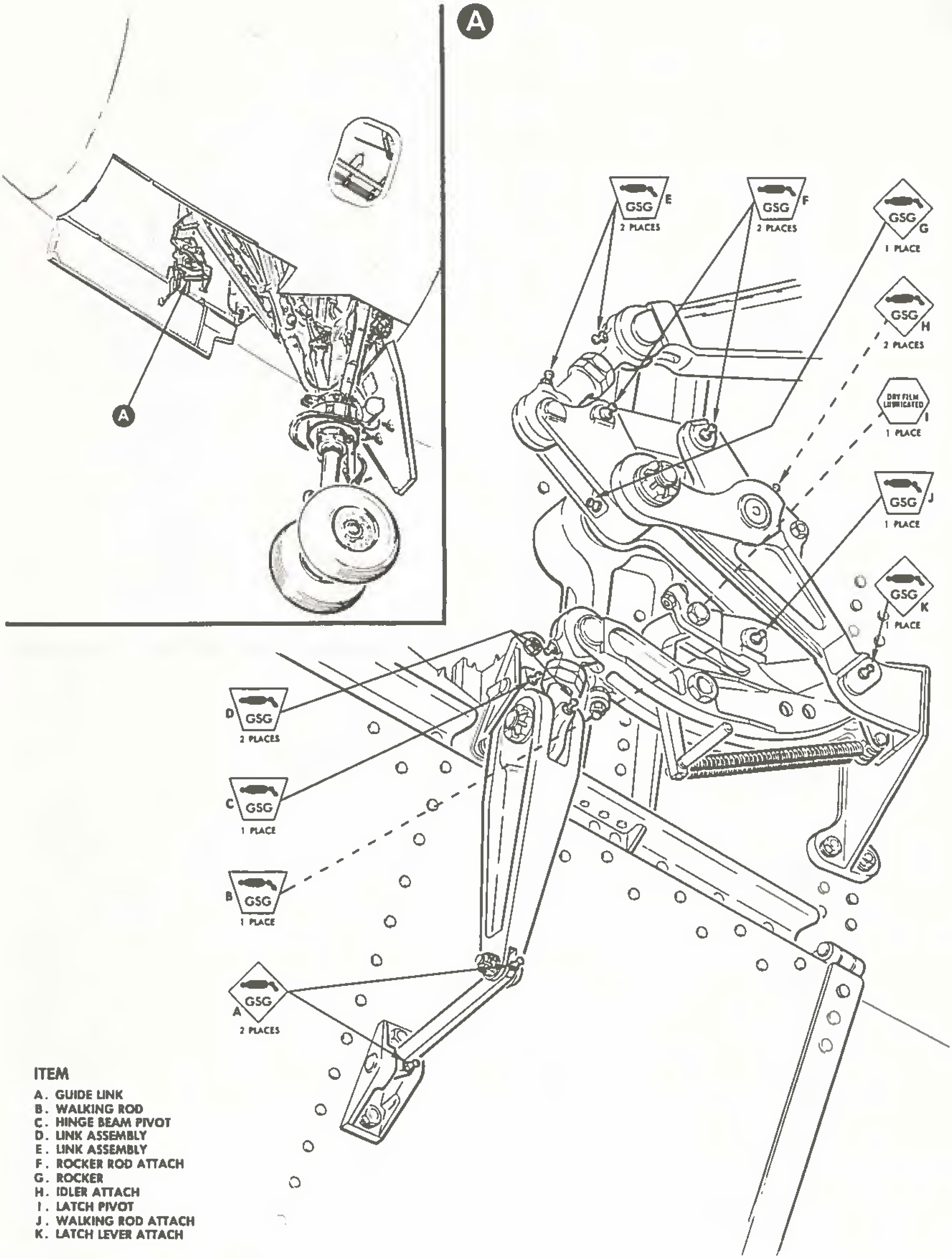
Service Door Hinge, Hold-Open Device and Slide Tube Installation
Figure 204



Forward and Aft Cargo Compartment
Zipper Panels Lubrication
Figure 205



Nose Landing Gear Uplock Lubrication
Figure 207



ITEM

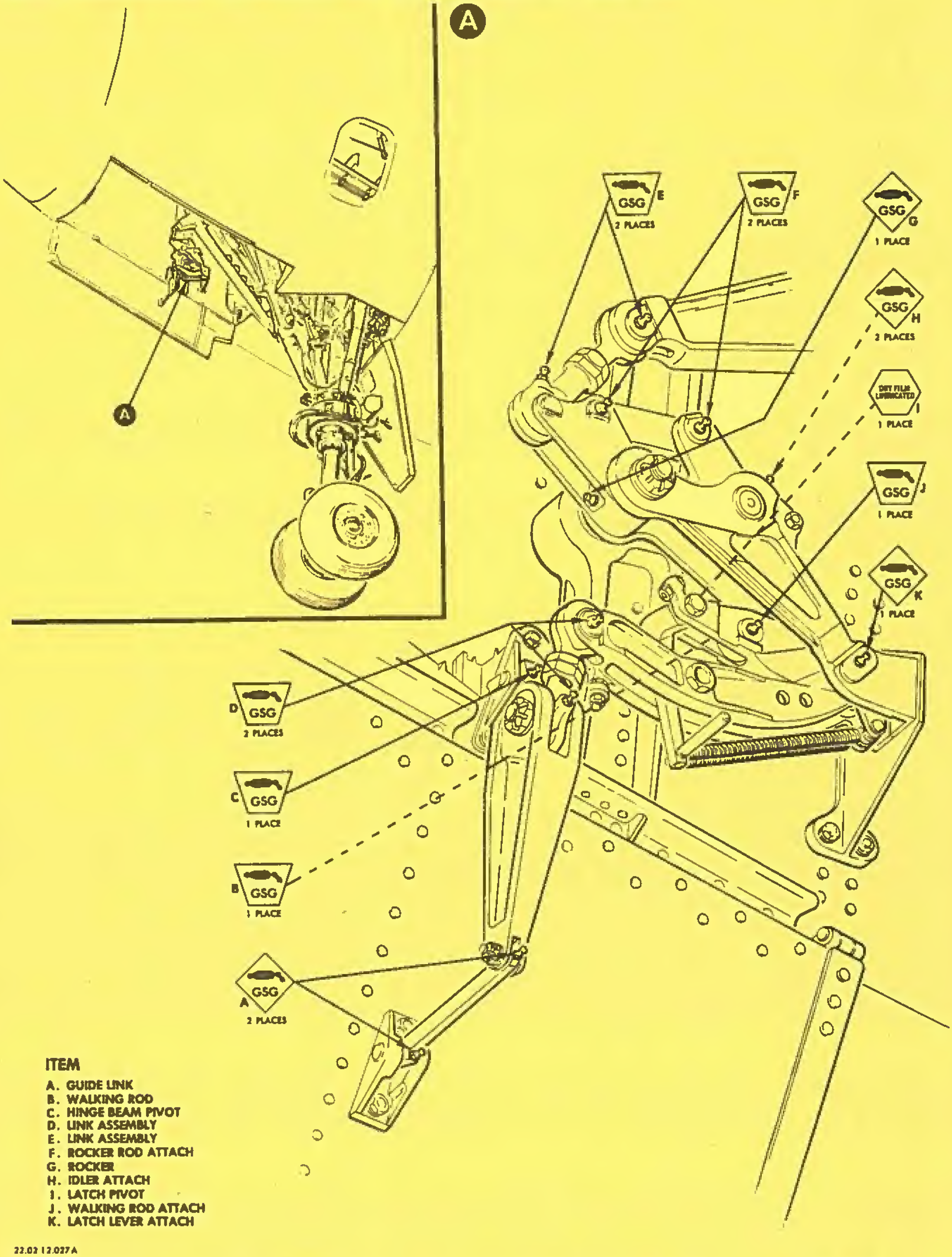
- A. GUIDE LINK
- B. WALKING ROD
- C. HINGE BEAM PIVOT
- D. LINK ASSEMBLY
- E. LINK ASSEMBLY
- F. ROCKER ROD ATTACH
- G. ROCKER
- H. IDLER ATTACH
- I. LATCH PIVOT
- J. WALKING ROD ATTACH
- K. LATCH LEVER ATTACH

22.02.12.027

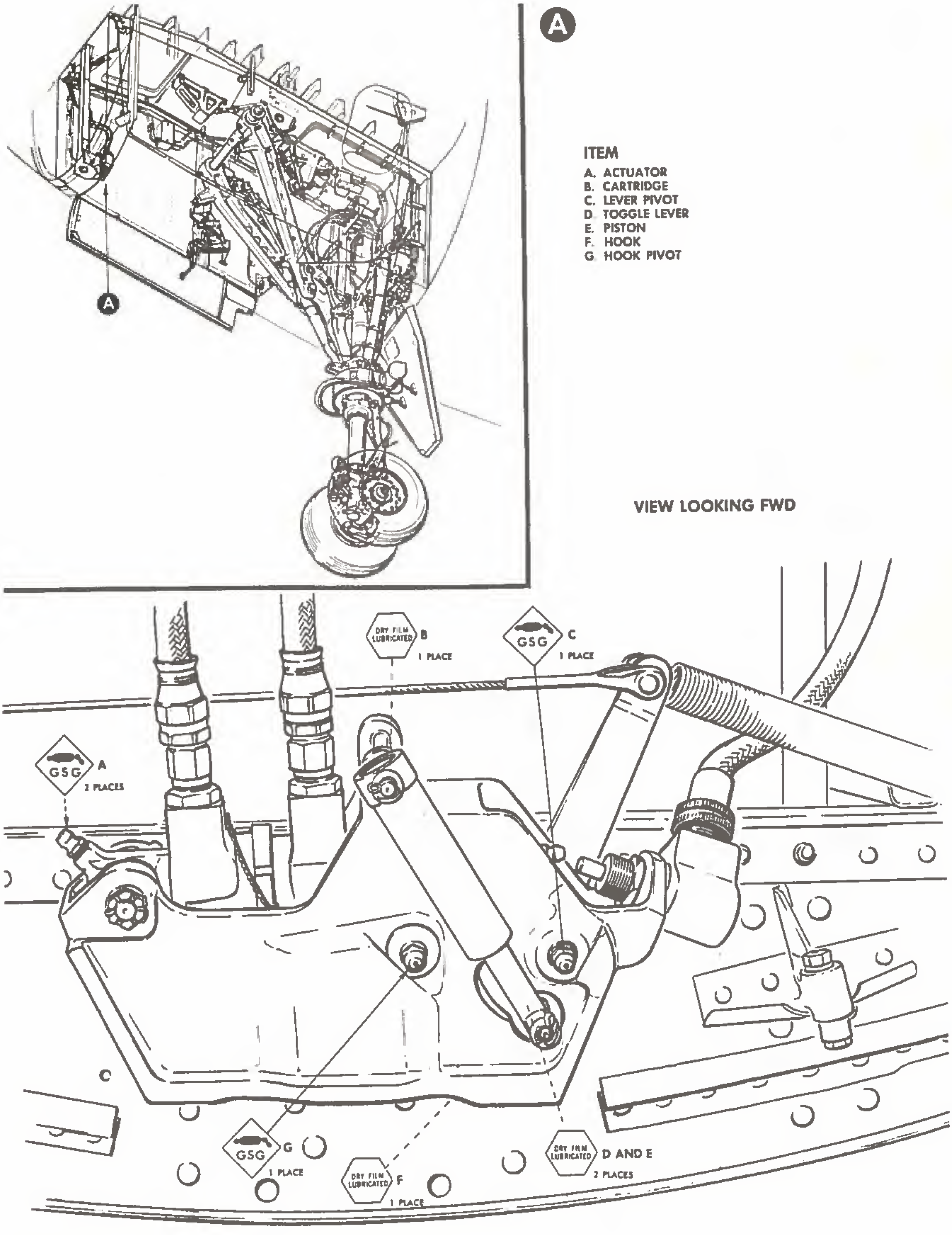
Nose Landing Gear Door Mechanism Lubrication
Figure 208

TEMPORARY REVISION NO. 12-3.
Insert facing 12-12-0, Page 212 (basic).

This illustration supersedes the illustration on Page 212.

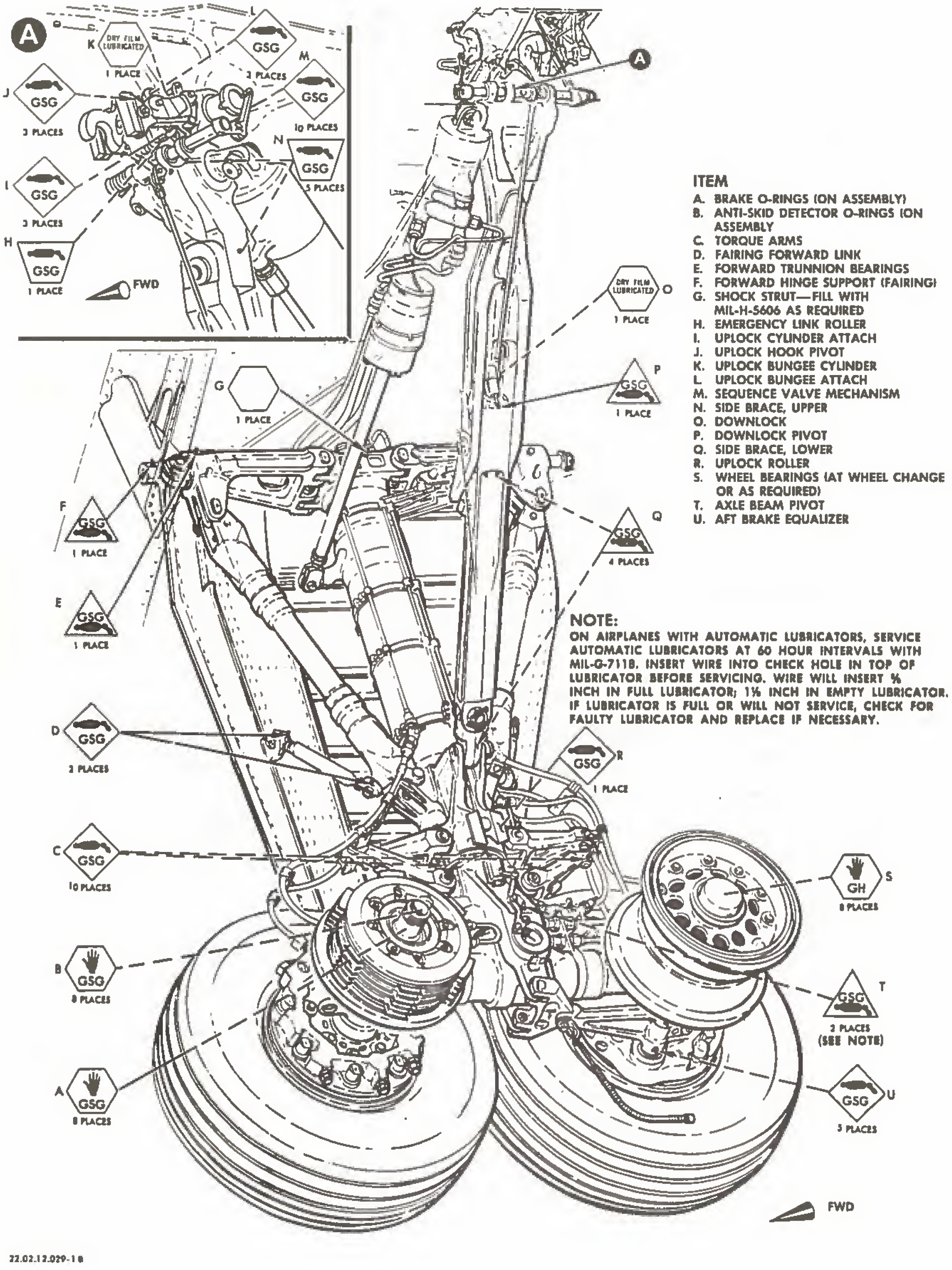


Nose Landing Gear Door Mechanism Lubrication
Figure 208



12.02.12.026

Nose Landing Gear Door Uplock Lubrication
Figure 209



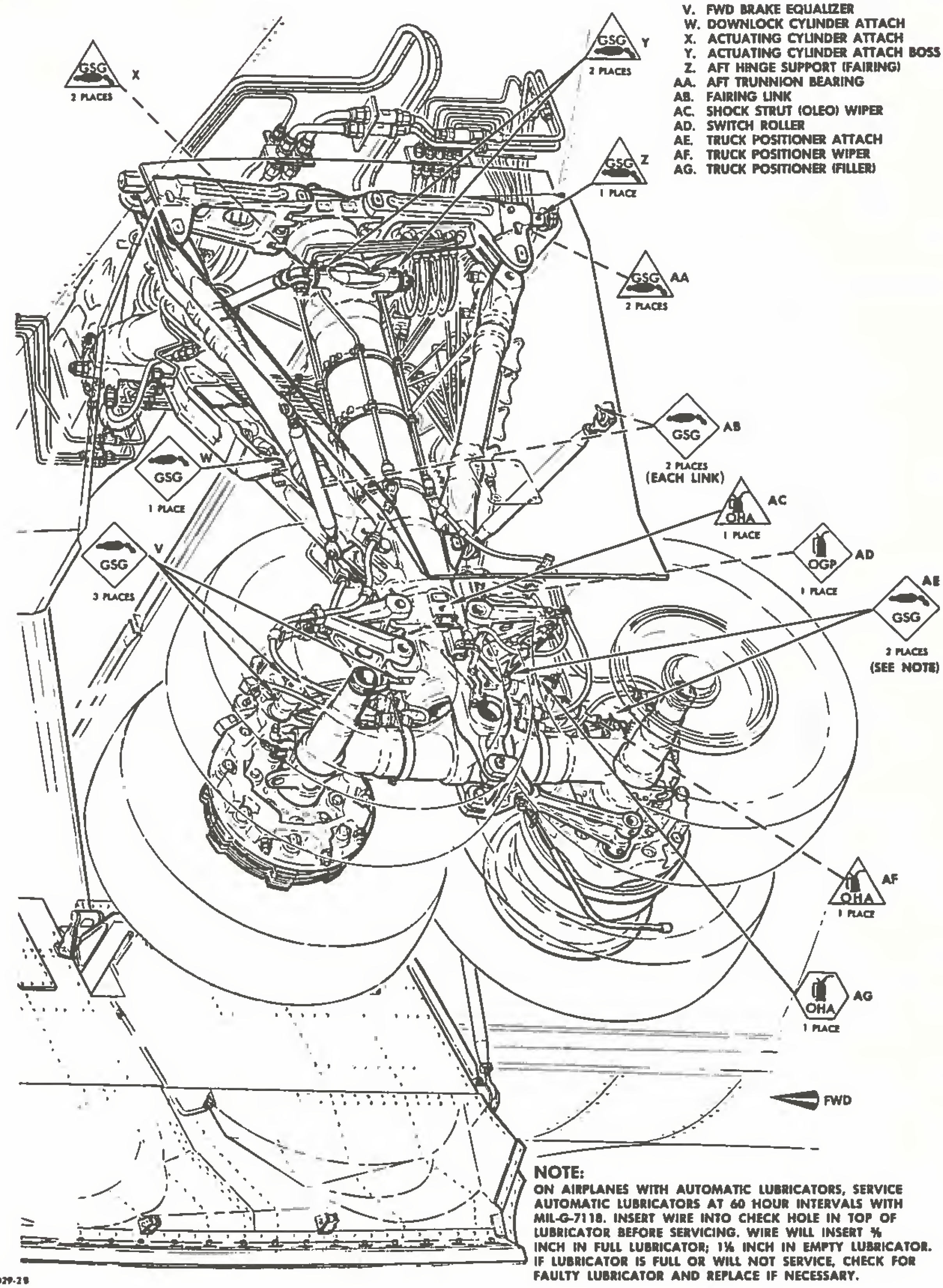
ITEM

A. BRAKE O-RINGS (ON ASSEMBLY)
B. ANTI-SKID DETECTOR O-RINGS (ON ASSEMBLY)
C. TORQUE ARMS
D. FAIRING FORWARD LINK
E. FORWARD TRUNNION BEARINGS
F. FORWARD HINGE SUPPORT (FAIRING)
G. SHOCK STRUT—FILL WITH MIL-H-5606 AS REQUIRED
H. EMERGENCY LINK ROLLER
I. UPLOCK CYLINDER ATTACH
J. UPLOCK HOOK PIVOT
K. UPLOCK BUNGEE CYLINDER
L. UPLOCK BUNGEE ATTACH
M. SEQUENCE VALVE MECHANISM
N. SIDE BRACE, UPPER
O. DOWNLOCK
P. DOWNLOCK PIVOT
Q. SIDE BRACE, LOWER
R. UPLOCK ROLLER
S. WHEEL BEARINGS (AT WHEEL CHANGE OR AS REQUIRED)
T. AXLE BEAM PIVOT
U. AFT BRAKE EQUALIZER

NOTE:
ON AIRPLANES WITH AUTOMATIC LUBRICATORS, SERVICE AUTOMATIC LUBRICATORS AT 60 HOUR INTERVALS WITH MIL-G-7118. INSERT WIRE INTO CHECK HOLE IN TOP OF LUBRICATOR BEFORE SERVICING. WIRE WILL INSERT ⅝ INCH IN FULL LUBRICATOR; 1⅛ INCH IN EMPTY LUBRICATOR. IF LUBRICATOR IS FULL OR WILL NOT SERVICE, CHECK FOR FAULTY LUBRICATOR AND REPLACE IF NECESSARY.

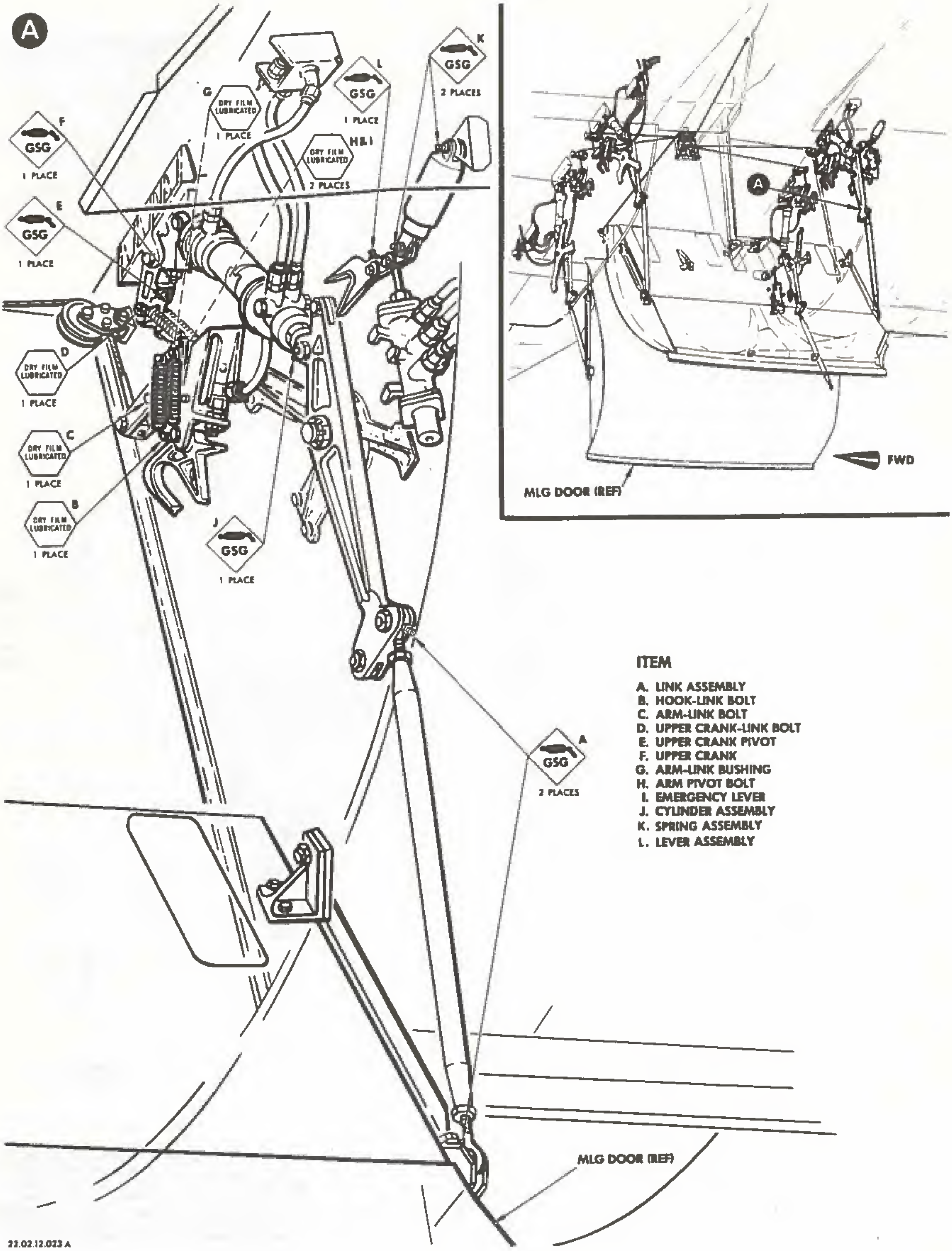
Main Landing Gear Lubrication
Figure 210 (Sheet 1 of 2)

ITEM
V. FWD BRAKE EQUALIZER
W. DOWNLOCK CYLINDER ATTACH
X. ACTUATING CYLINDER ATTACH
Y. ACTUATING CYLINDER ATTACH BOSS
Z. AFT HINGE SUPPORT (FAIRING)
AA. AFT TRUNNION BEARING
AB. FAIRING LINK
AC. SHOCK STRUT (OLEO) WIPER
AD. SWITCH ROLLER
AE. TRUCK POSITIONER ATTACH
AF. TRUCK POSITIONER WIPER
AG. TRUCK POSITIONER (FILLER)



NOTE:
ON AIRPLANES WITH AUTOMATIC LUBRICATORS, SERVICE AUTOMATIC LUBRICATORS AT 60 HOUR INTERVALS WITH MIL-G-7118. INSERT WIRE INTO CHECK HOLE IN TOP OF LUBRICATOR BEFORE SERVICING. WIRE WILL INSERT ⅝ INCH IN FULL LUBRICATOR; 1⅛ INCH IN EMPTY LUBRICATOR. IF LUBRICATOR IS FULL OR WILL NOT SERVICE, CHECK FOR FAULTY LUBRICATOR AND REPLACE IF NECESSARY.

Main Landing Gear Lubrication
Figure 210 (Sheet 2 of 2)



Main Landing Gear Door Mechanism and Main
Landing Gear Sequence Valve Linkage Lubrication
Figure 211

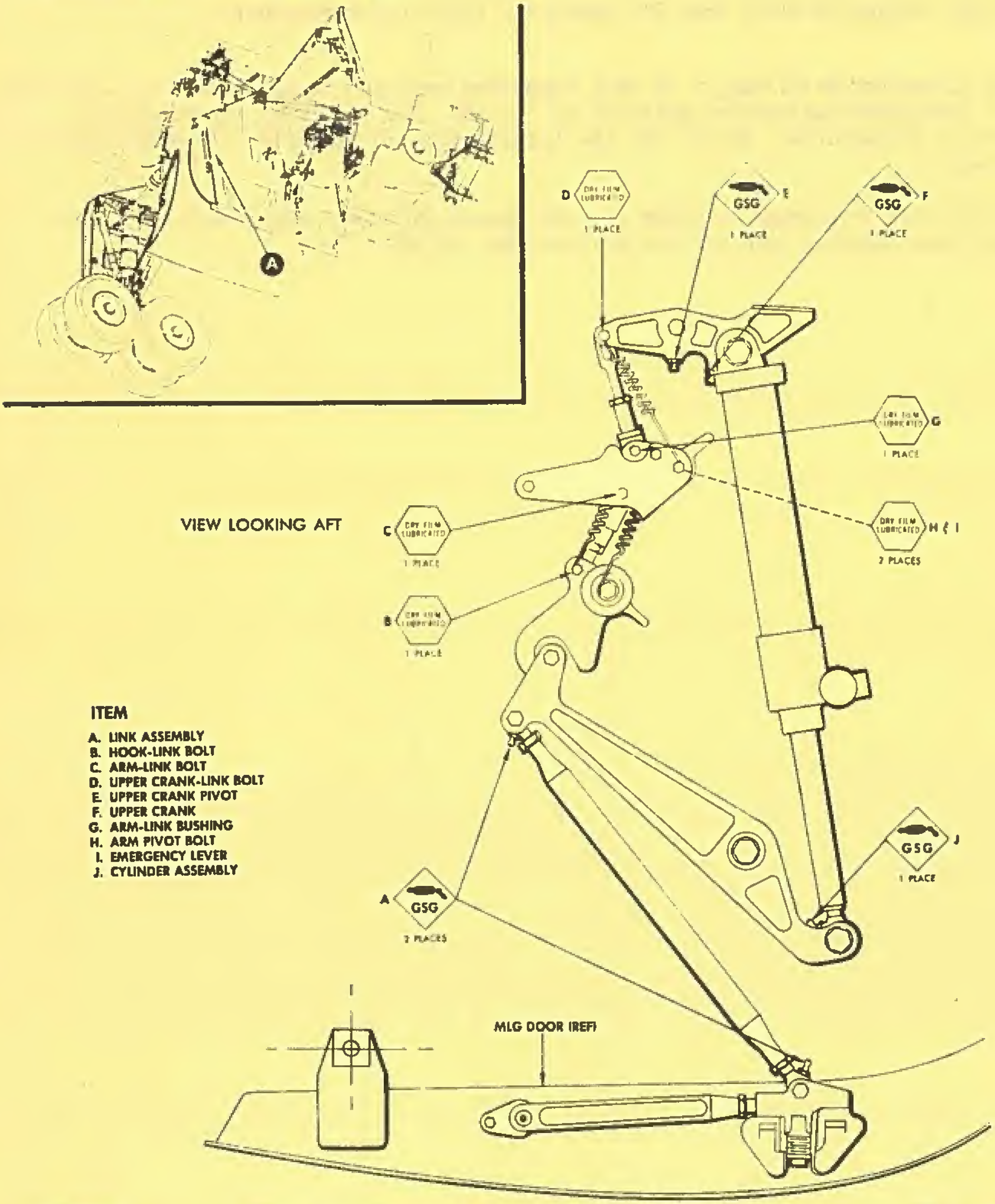
TEMPORARY REVISION NO. 12-63.

Insert facing 12-12-0, Page 216 dated May 18/64 (or subsequent).

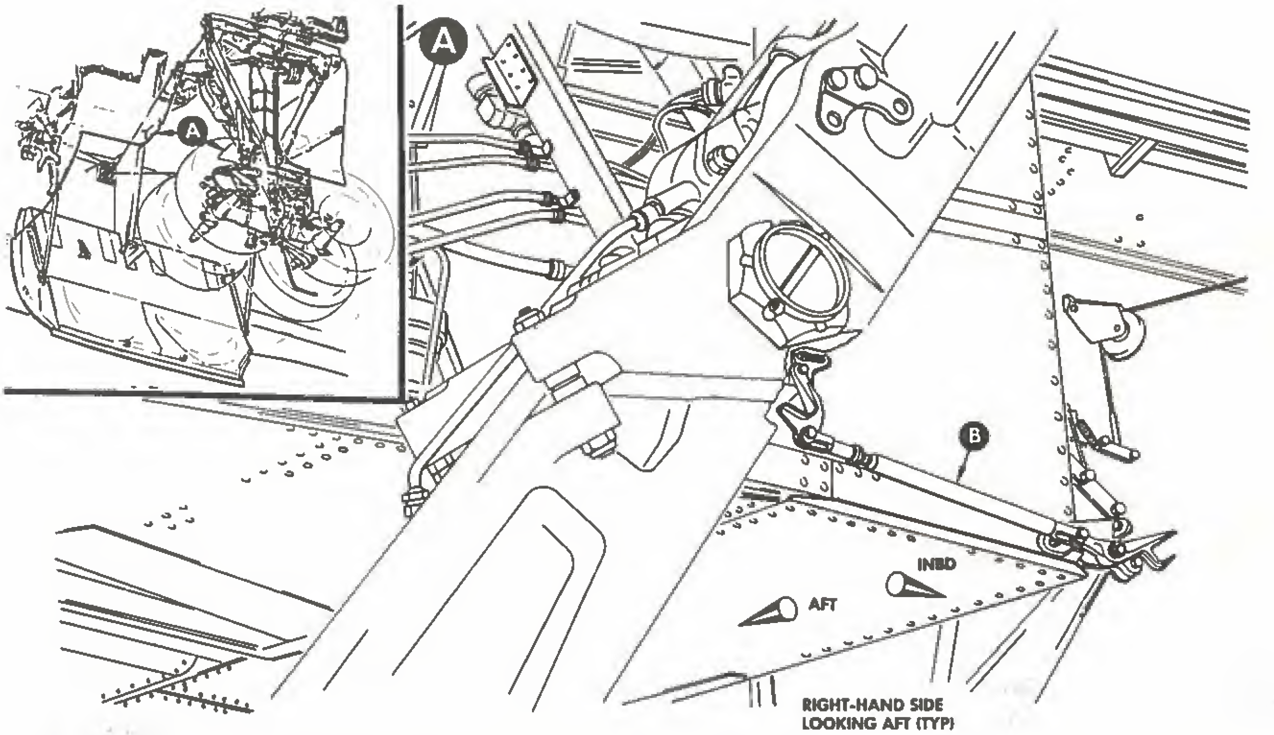
The illustration on Page 2 of this temporary revision is applicable to airplanes not incorporating Service Bulletin No. 32-36. For airplanes incorporating Service Bulletin No. 32-36, use the illustration on Page 216 of the maintenance manual.

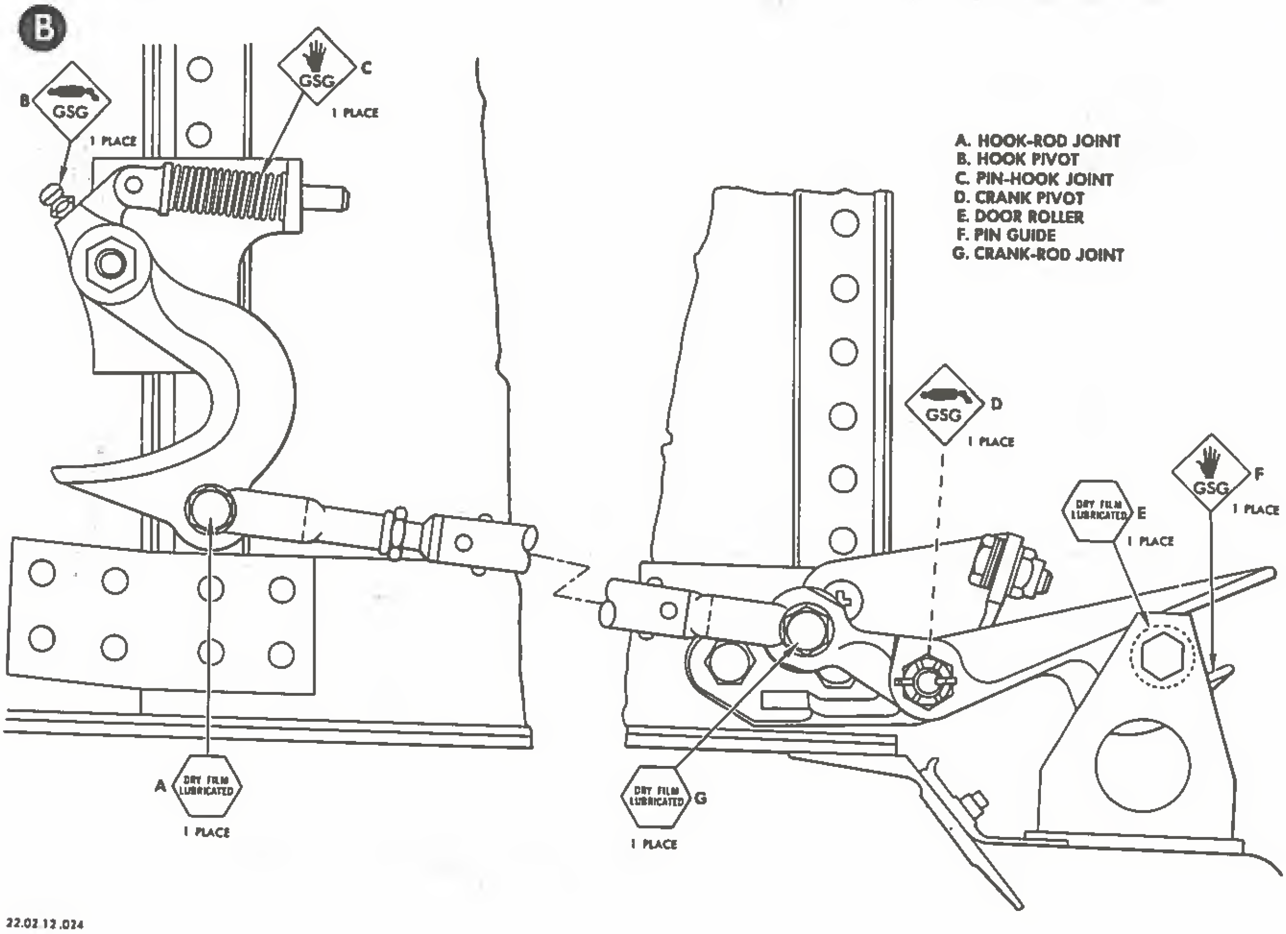
Retain this temporary revision in your manual until all applicable airplanes have been modified per Service Bulletin No. 32-36.

TEMPORARY REVISION NO. 12-63.

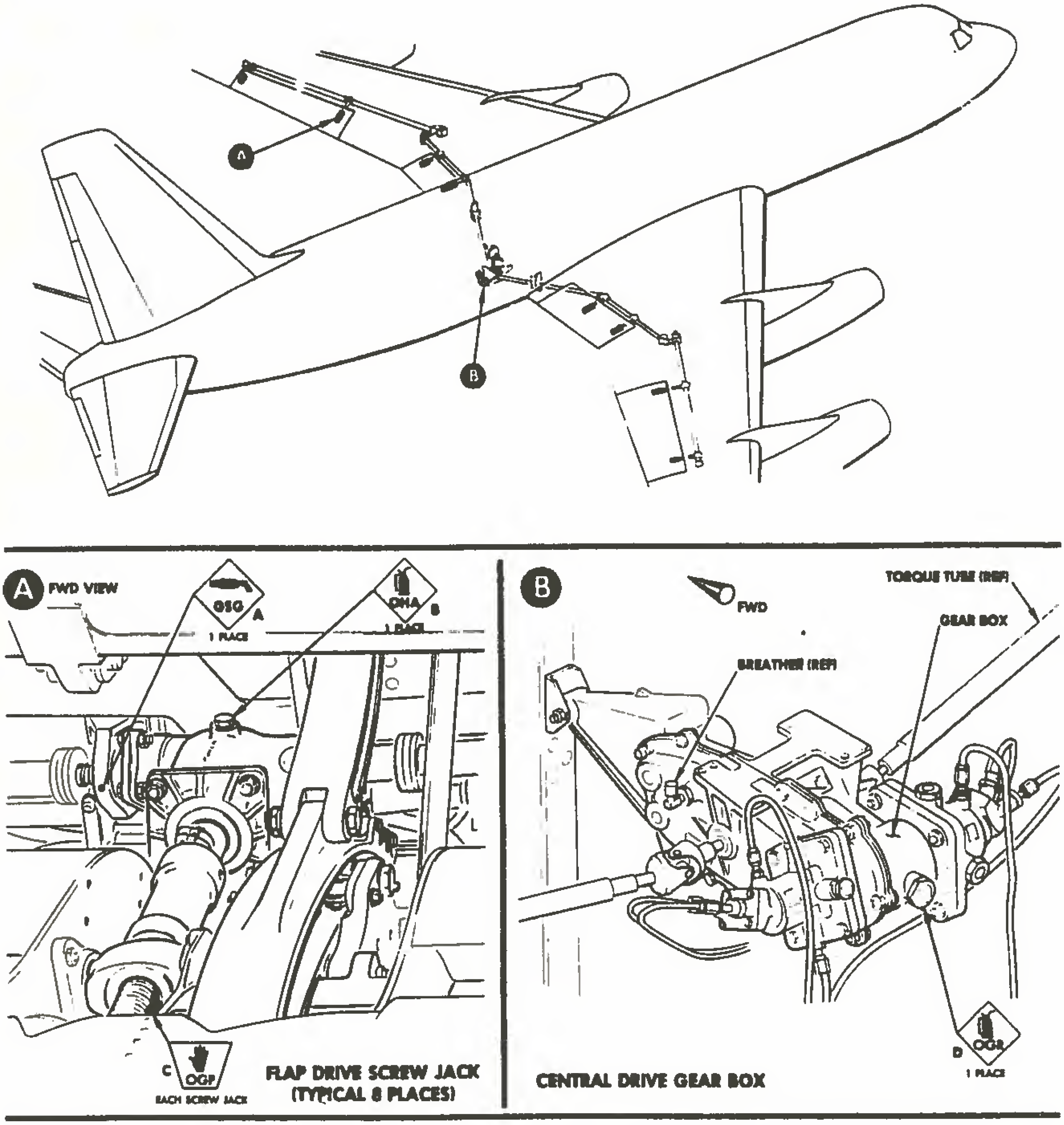


Main Landing Gear Door Mechanism Lubrication
Figure 211





Main Landing Gear Fairing Uplock Lubrication
Figure 212



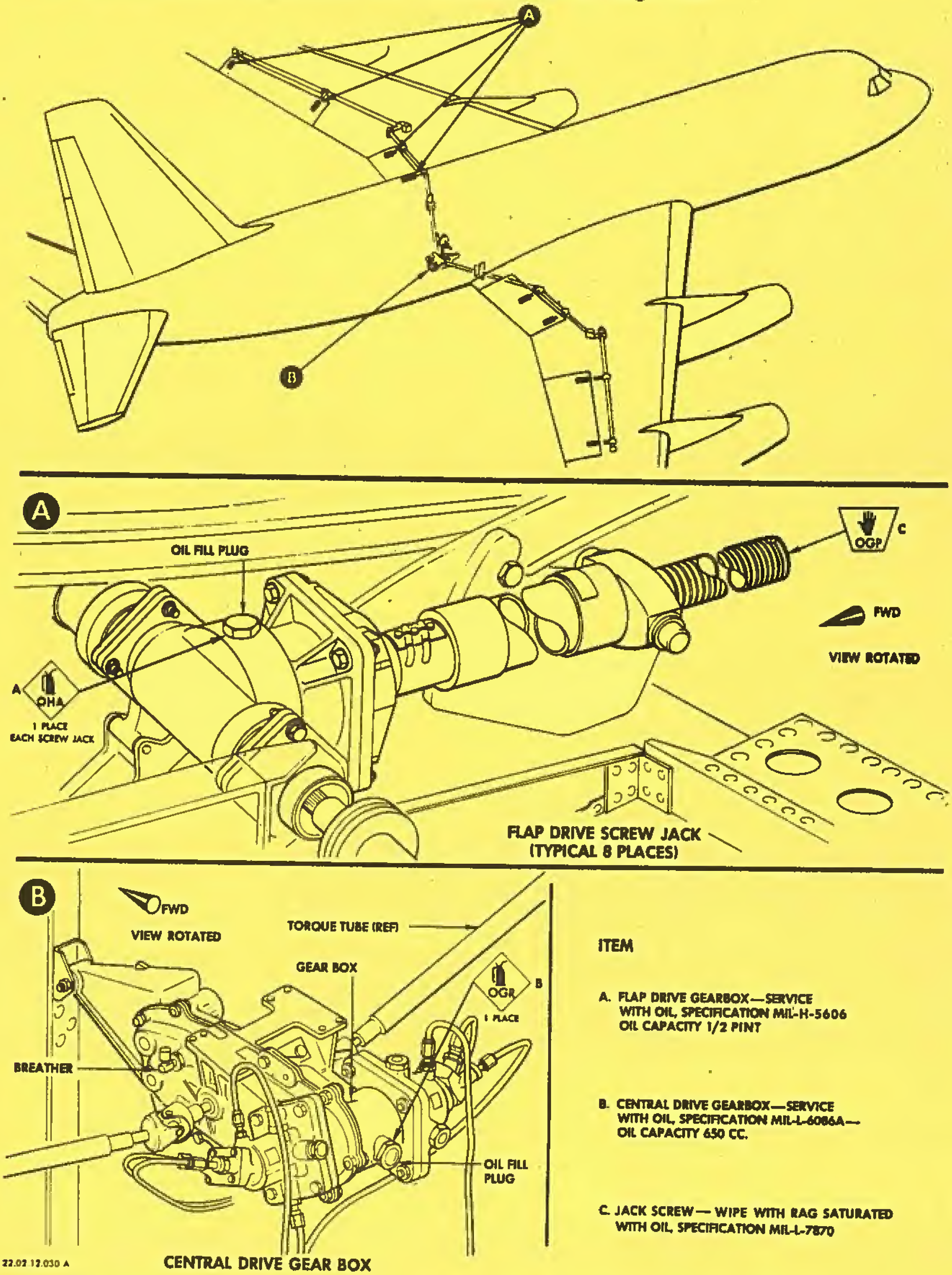
ITEMS	NOTES
A. FLAP ACTUATOR SUPPORT	
B. FLAP ACTUATOR UNIT	REMOVE FILL PLUG AND, USING STEEL SCALE AS DIP STICK, MEASURE OIL IN ACTUATOR GEARBOX. OIL LEVEL SHOULD MEASURE 2.25 TO 2.50 INCHES. SERVICE WITH OIL, SPECIFICATION MIL-H-5606. CHANGE OIL EVERY 2000 HOURS. UNIT CAPACITY IS 0.5 PINT.
C. SCREW JACK	
D. CENTRAL DRIVE GEARBOX	ADD OIL TO OVERFLOW EVERY 300 HOURS. CHANGE OIL EVERY 6000 HOURS. UNIT CAPACITY 1.4 PINT.

22.02.12.171

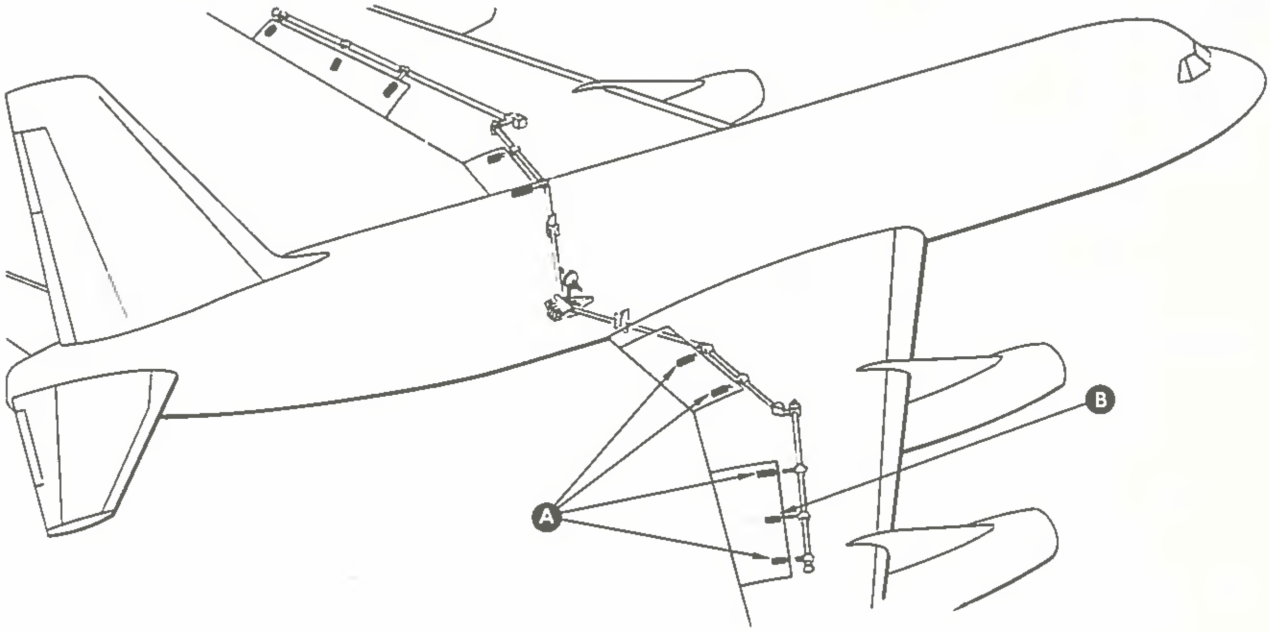
Flap Drive System Lubrication
Figure 213

TEMPORARY REVISION NO. 12-12.
Insert facing 12-12-0, Page 218 (basic).

This illustration supersedes the illustration on Page 218.



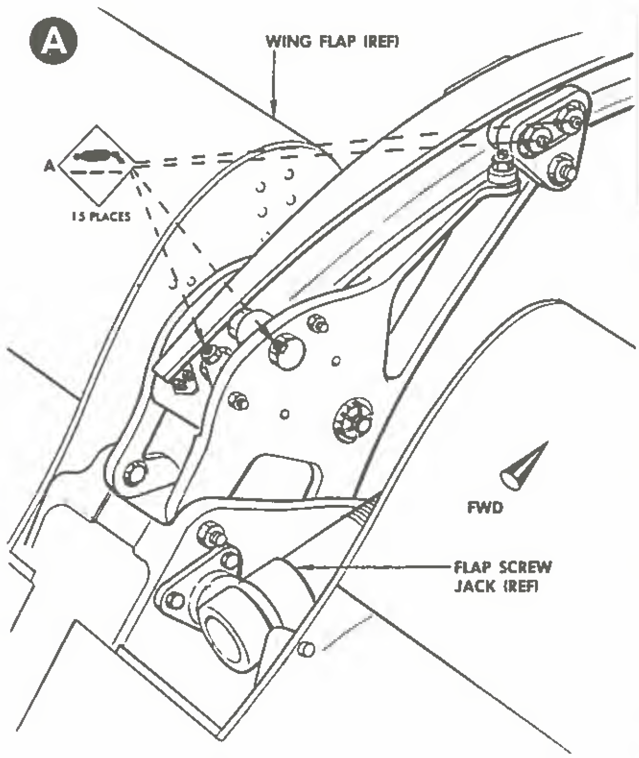
Flap Drive System Lubrication
Figure 213



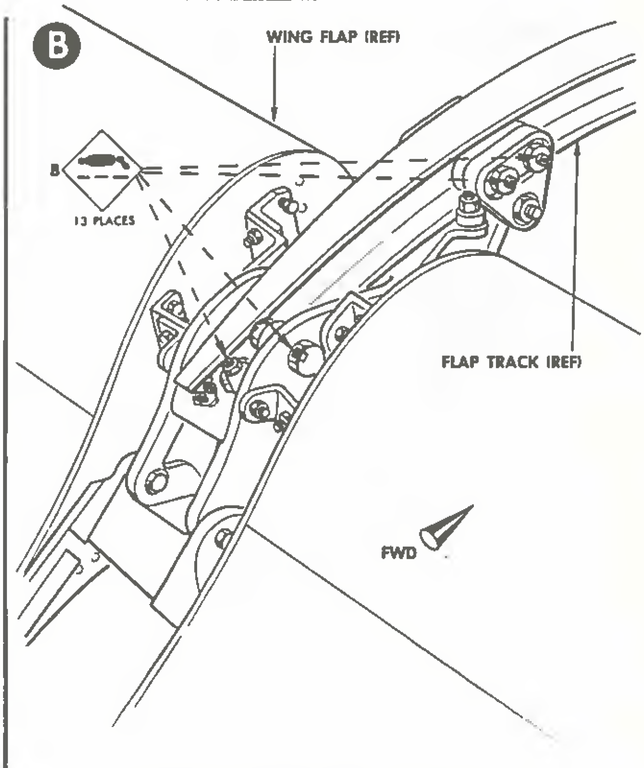
ITEM

A. FLAP CARRIAGE ROLLER—LUBRICATE 15 POINTS ON EACH CARRIAGE (TWO CARRIAGES ON INBD FLAPS AND THE INBD AND OUTBD CARRIAGES ON OUTBD FLAPS)

B. FLAP CARRIAGE ROLLER—LUBRICATE 13 POINTS ON EACH CARRIAGE (CENTER CARRIAGE ON EACH OUTBD FLAP)



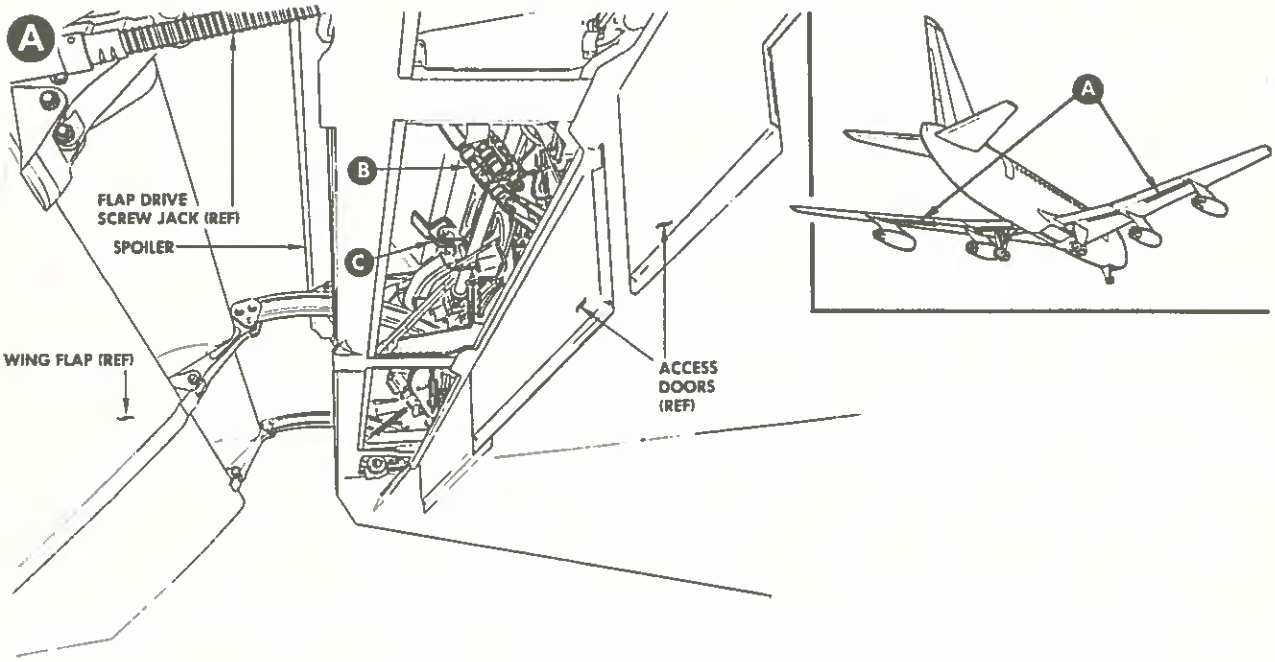
FLAP ROLLER CARRIAGE (TYPICAL 4 PLACES EACH WING)



FLAP ROLLER CARRIAGE (TYPICAL 1 PLACE EACH WING)

22 02 12.031

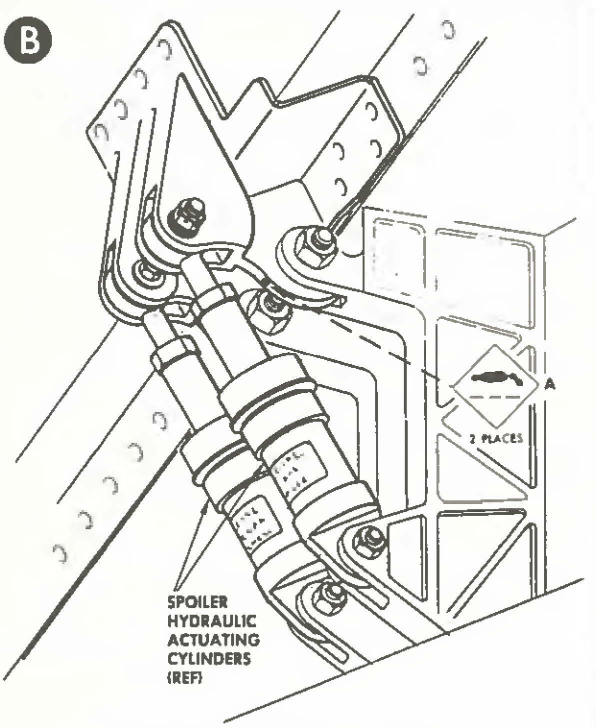
Flap Carriage Rollers Lubrication
Figure 214



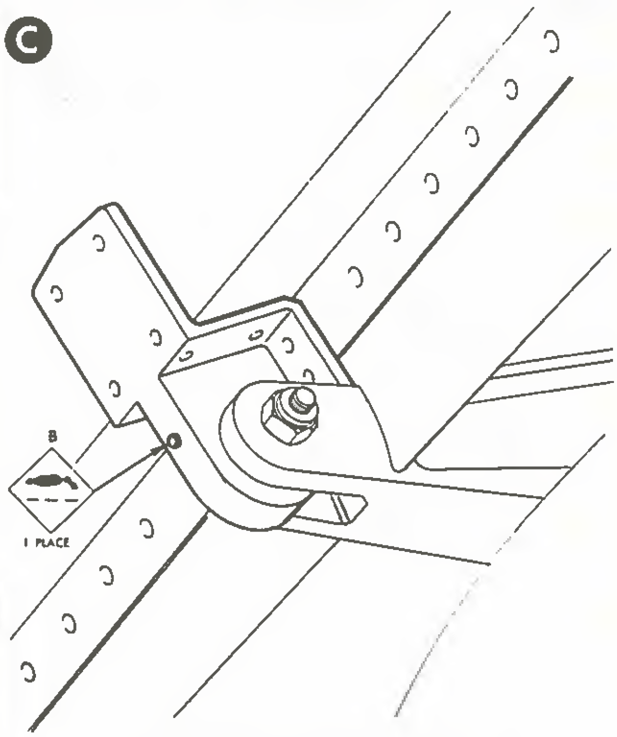
LH OUTBD SPOILER SHOWN, RH OUTBD SPOILER IDENTICAL—INBD SPOILERS SIMILAR

ITEM

A. DOUBLE HINGE FITTING (TYPICAL 2 PLACES EACH OUTBD SPOILER—1 PLACE EACH INBD SPOILER)
B. SINGLE HINGE FITTING (TYPICAL 4 PLACES EACH OUTBD SPOILER—2 PLACES EACH INBD SPOILER)



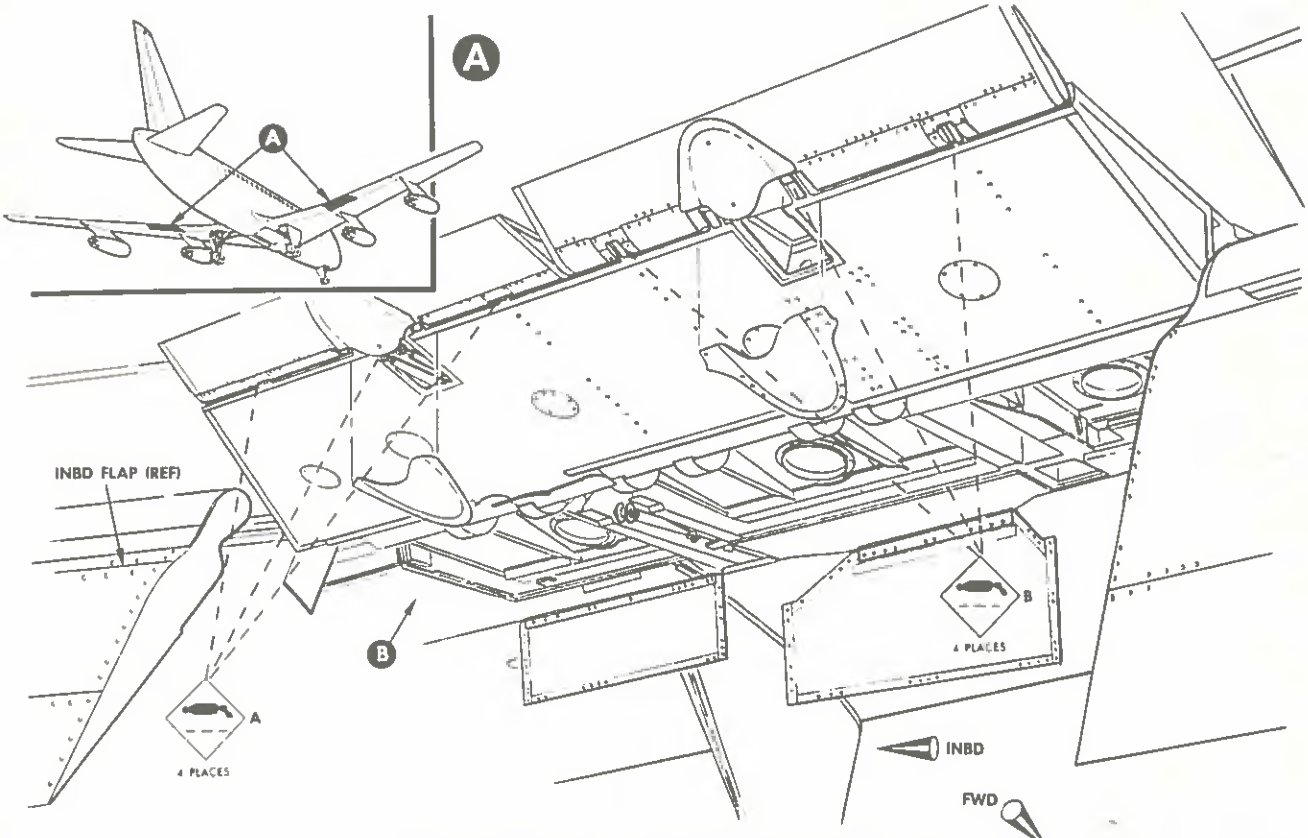
DOUBLE HINGE FITTING (TYPICAL)



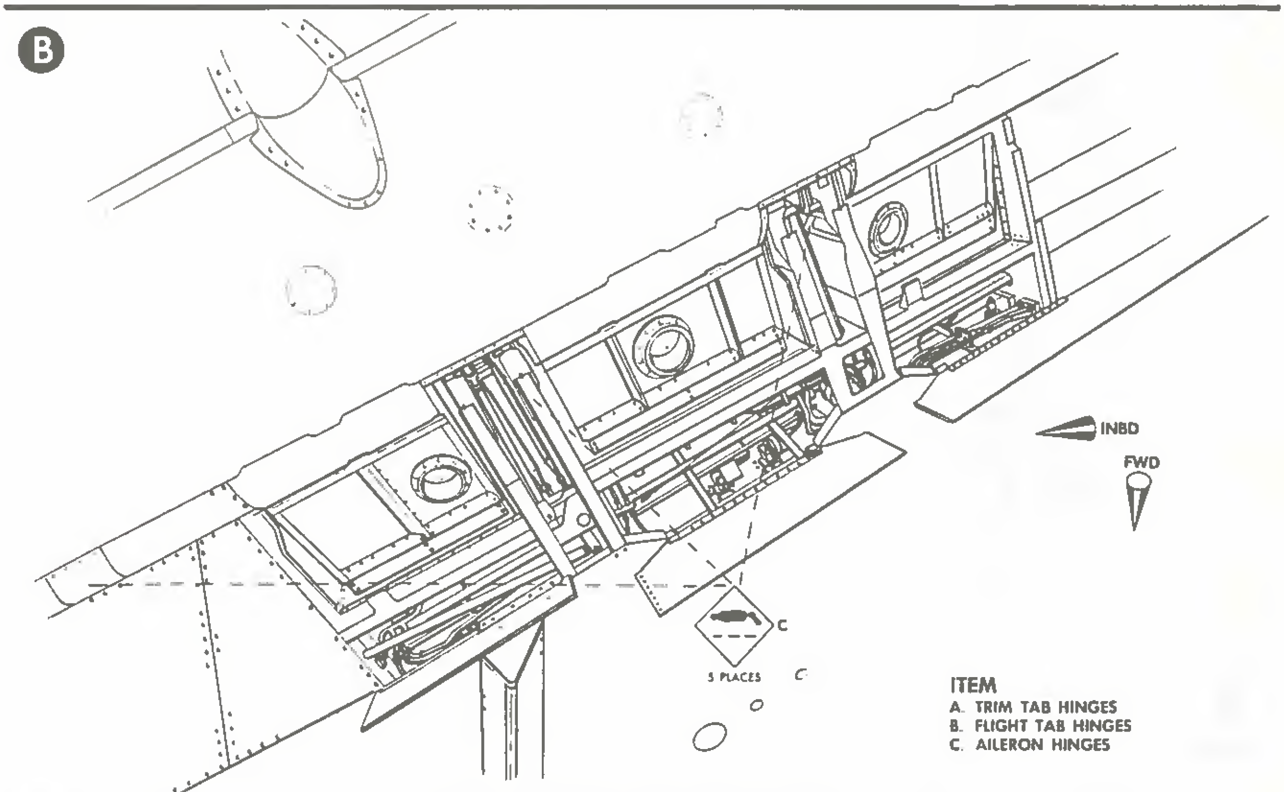
SINGLE HINGE FITTING (TYPICAL)

22.02.12.032

Spoiler Hinge Lubrication
Figure 215

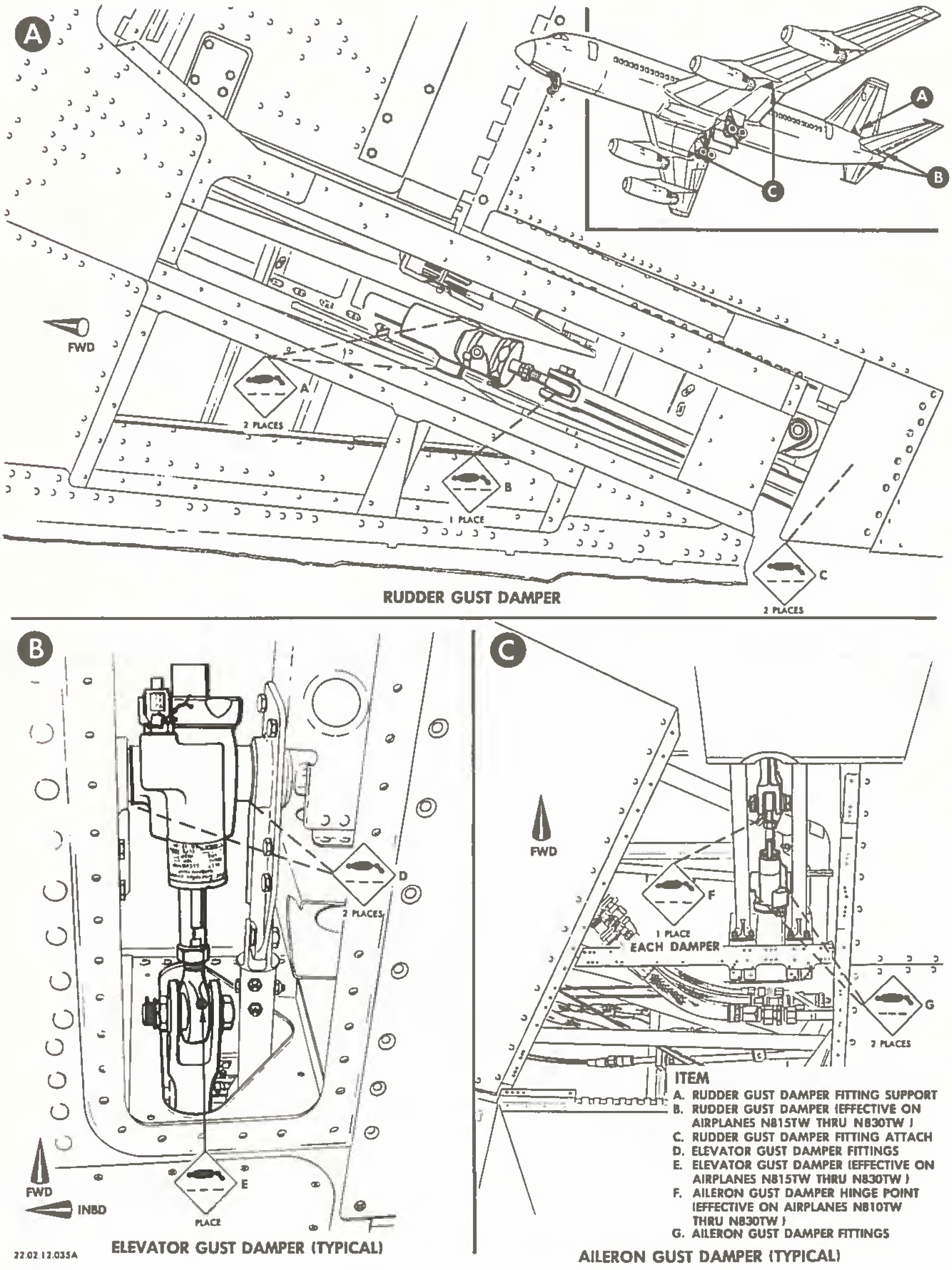


VIEW LOOKING UP—RH AILERON (LH AILERON SIMILAR)

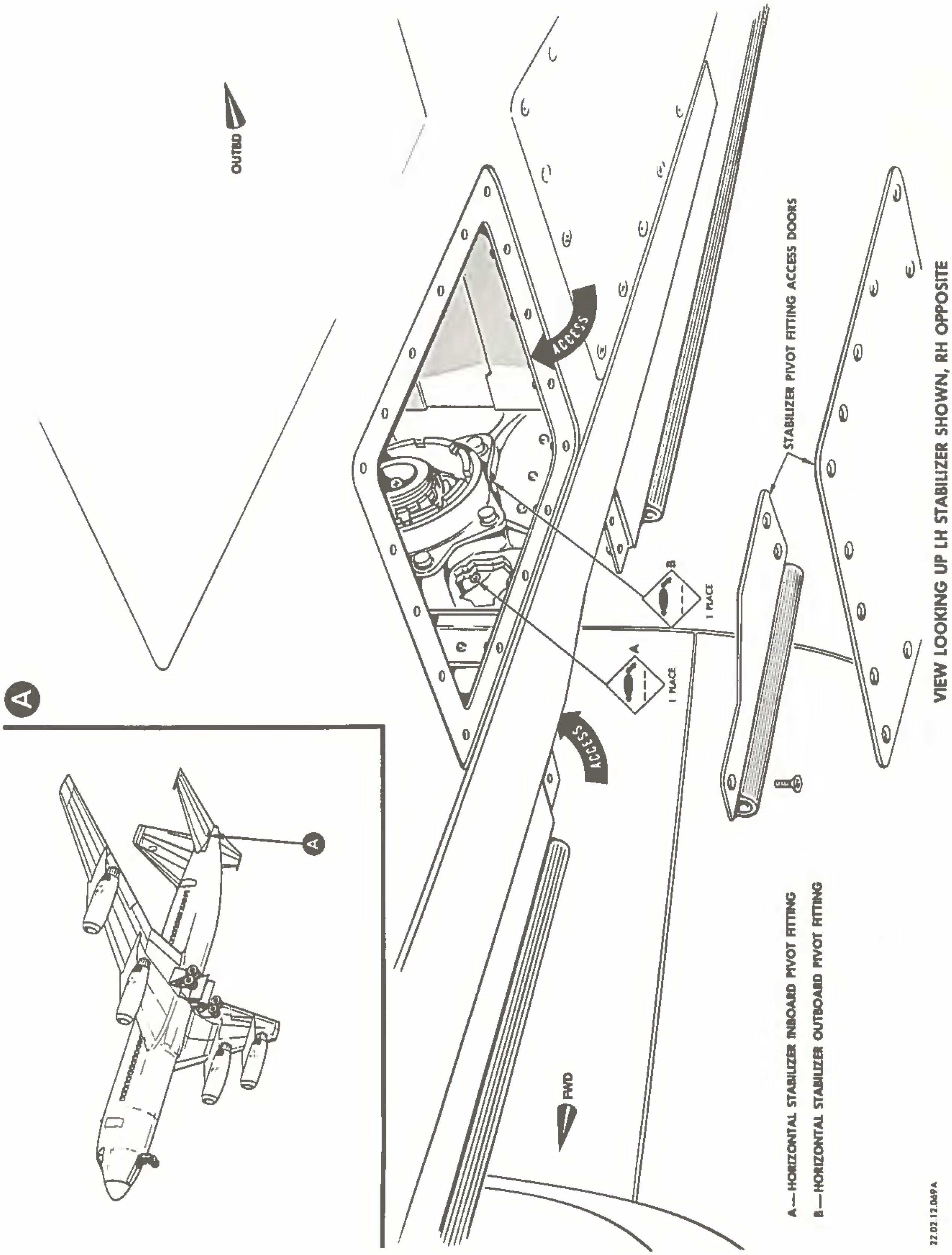


TYPICAL AILERON HINGE MECHANISM

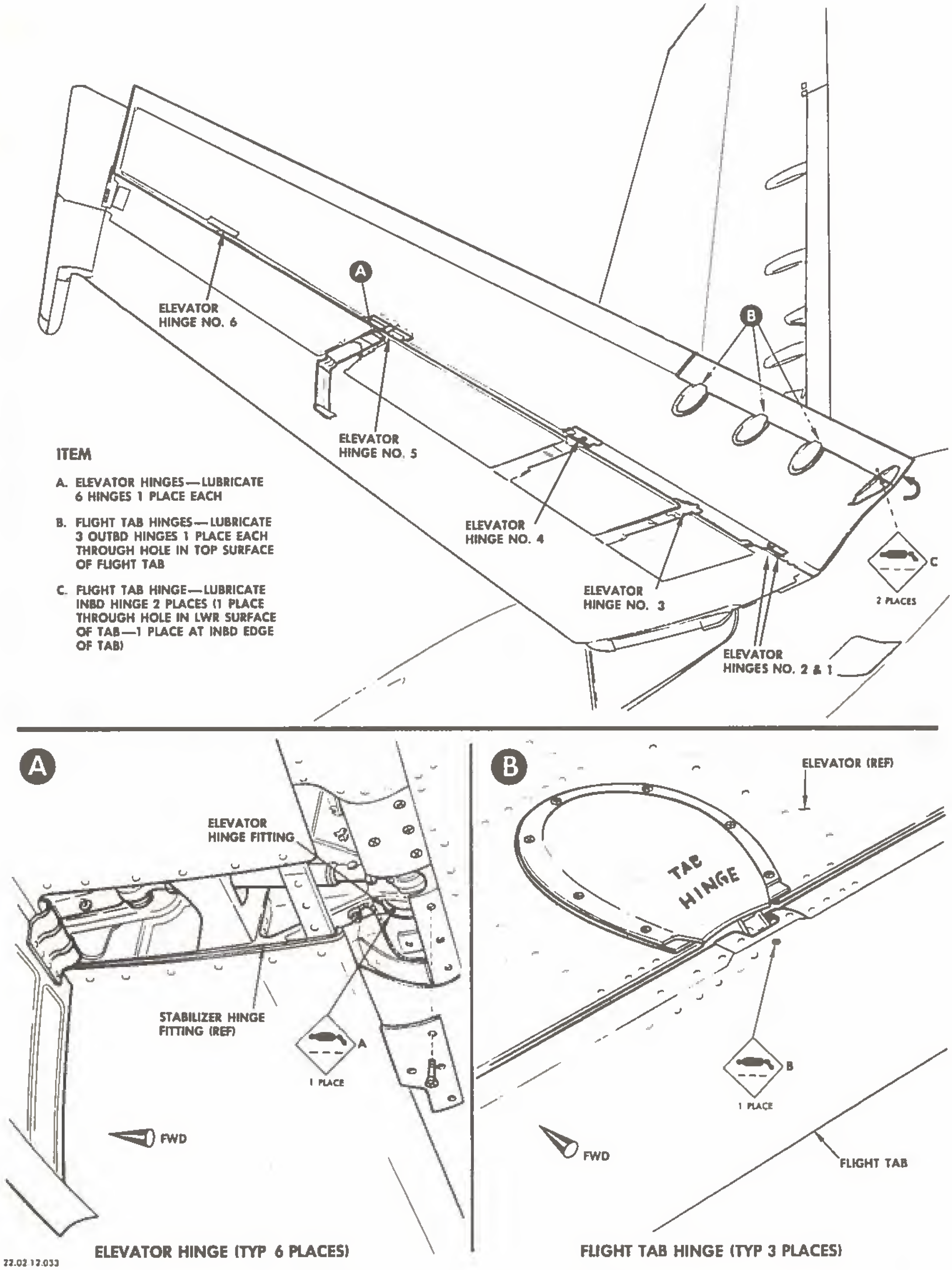
Aileron, Aileron Trim Tab and Flight
Tab Hinge Lubrication
Figure 216



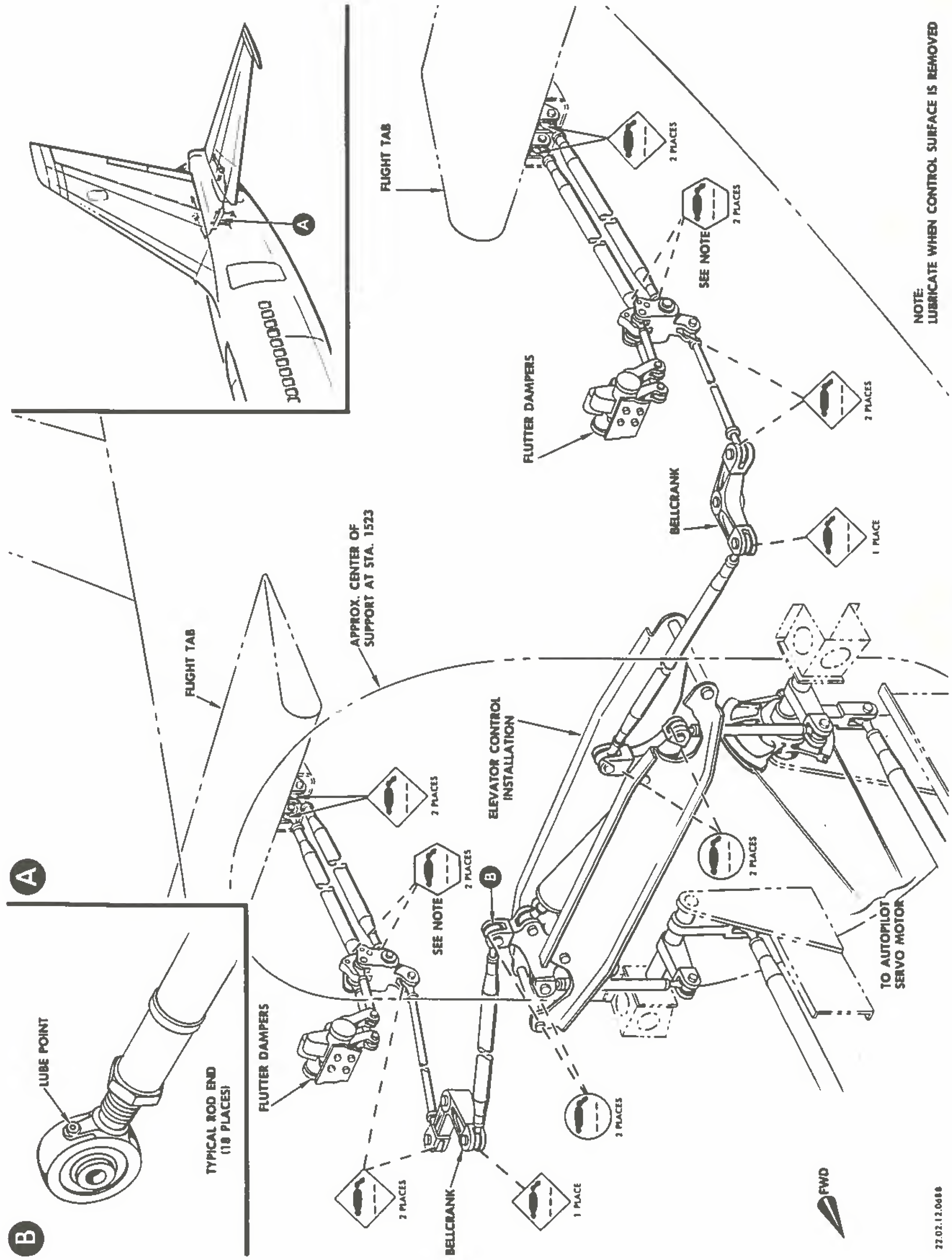
Aileron, Elevator and Rudder
Gust Dampers Lubrication
Figure 217



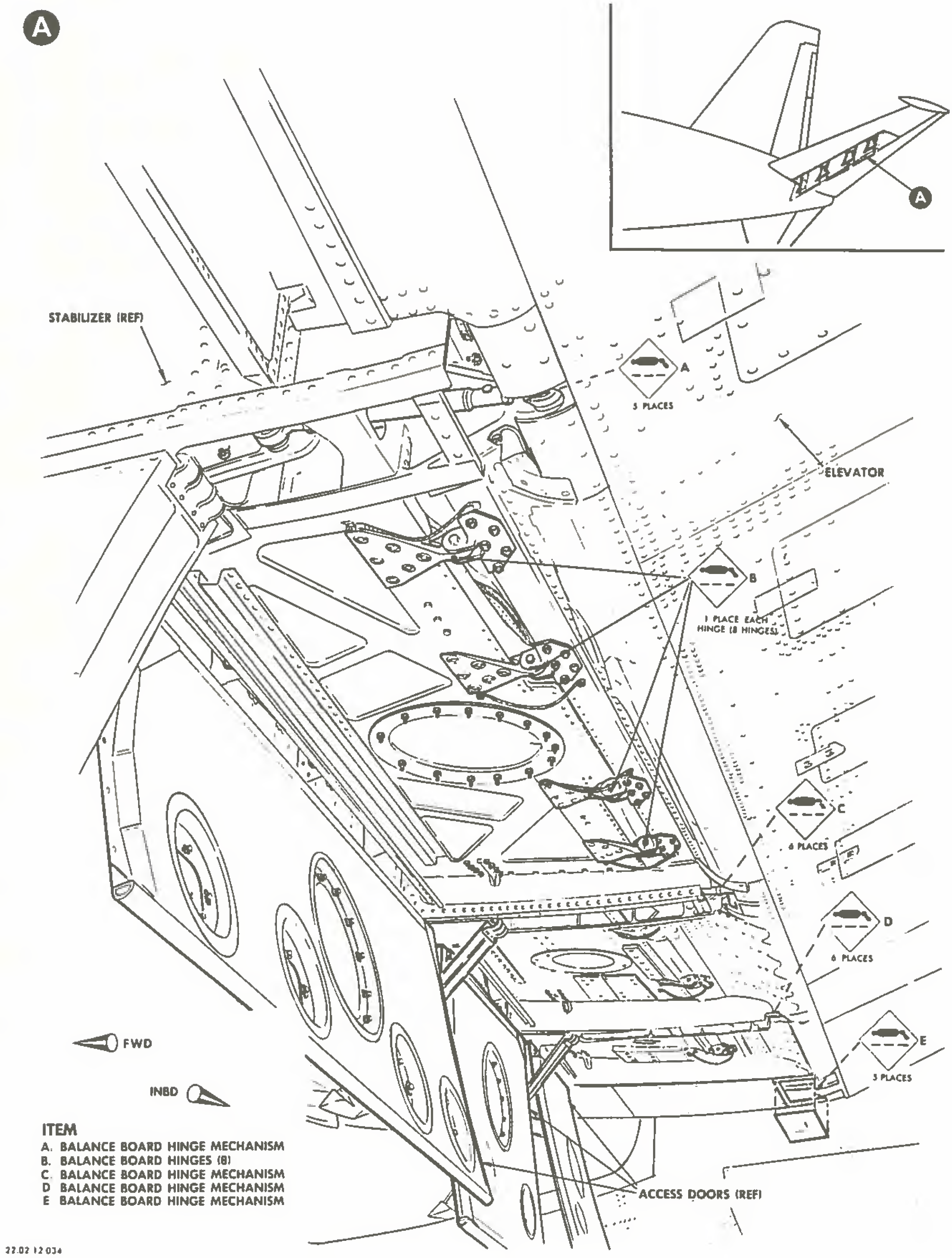
Horizontal Stabilizer Hinge Lubrication
Figure 218



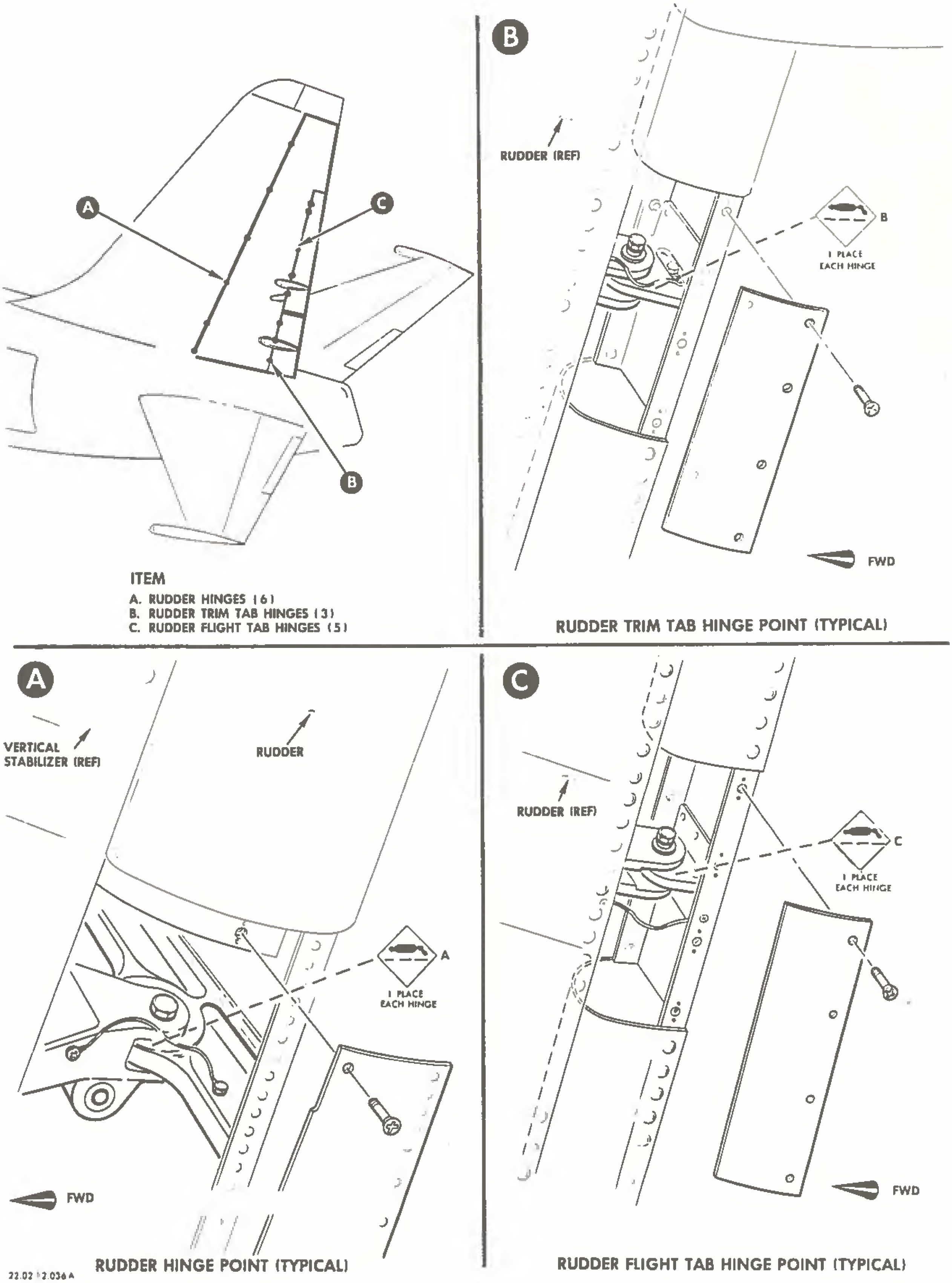
Elevator and Elevator Flight
Tab Hinge Lubrication
Figure 219



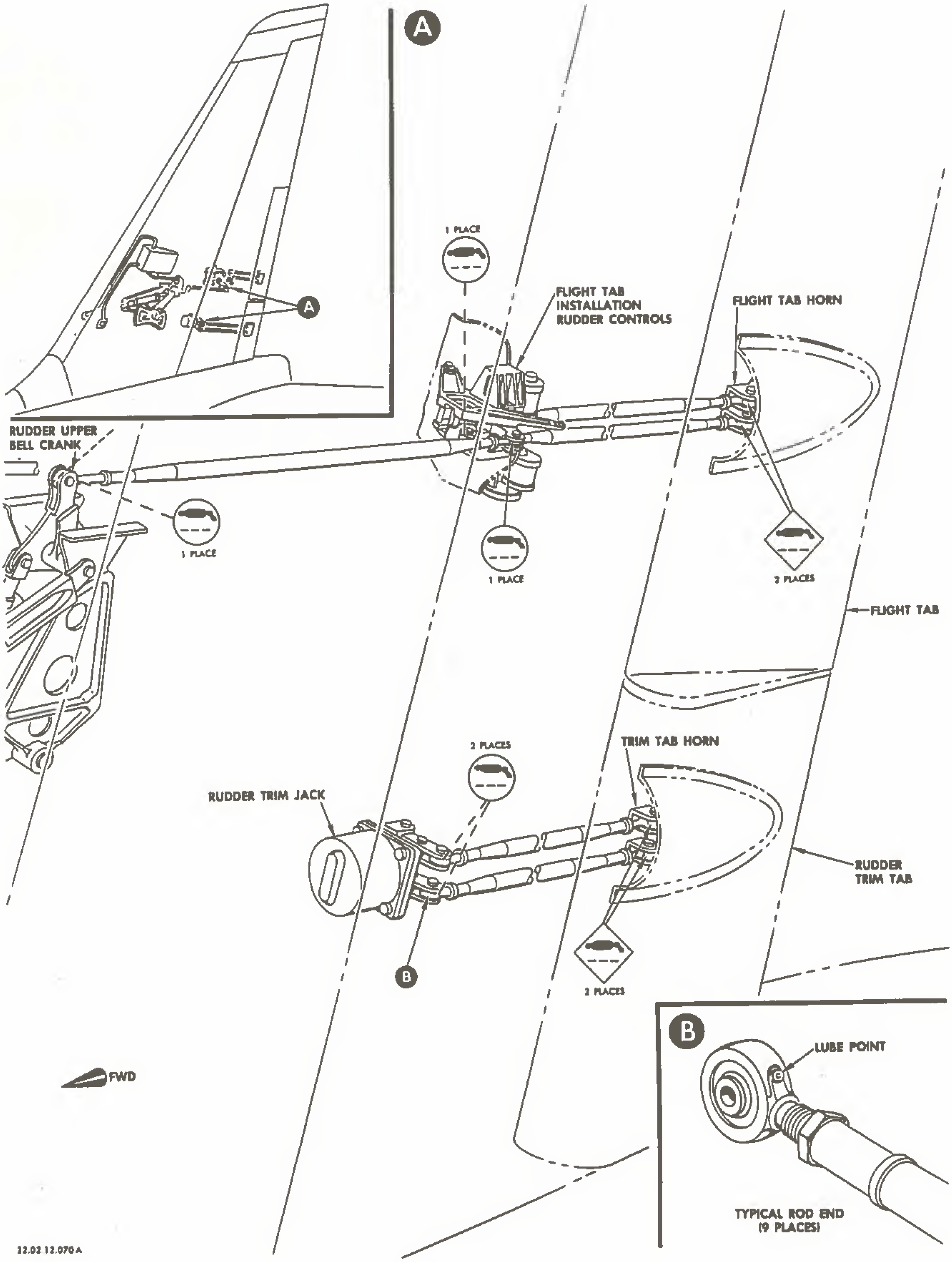
Elevator Control Rod End Bearings Lubrication
Figure 220



Elevator Balance Board Hinge and
Hinge Mechanisms Lubrication
Figure 221



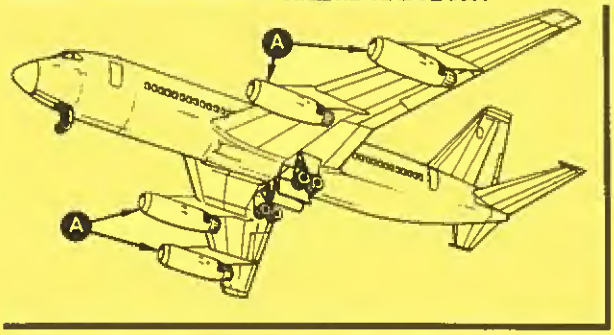
Rudder, Rudder Trim Tab,
and Flight Tab Hinge Lubrication
Figure 222

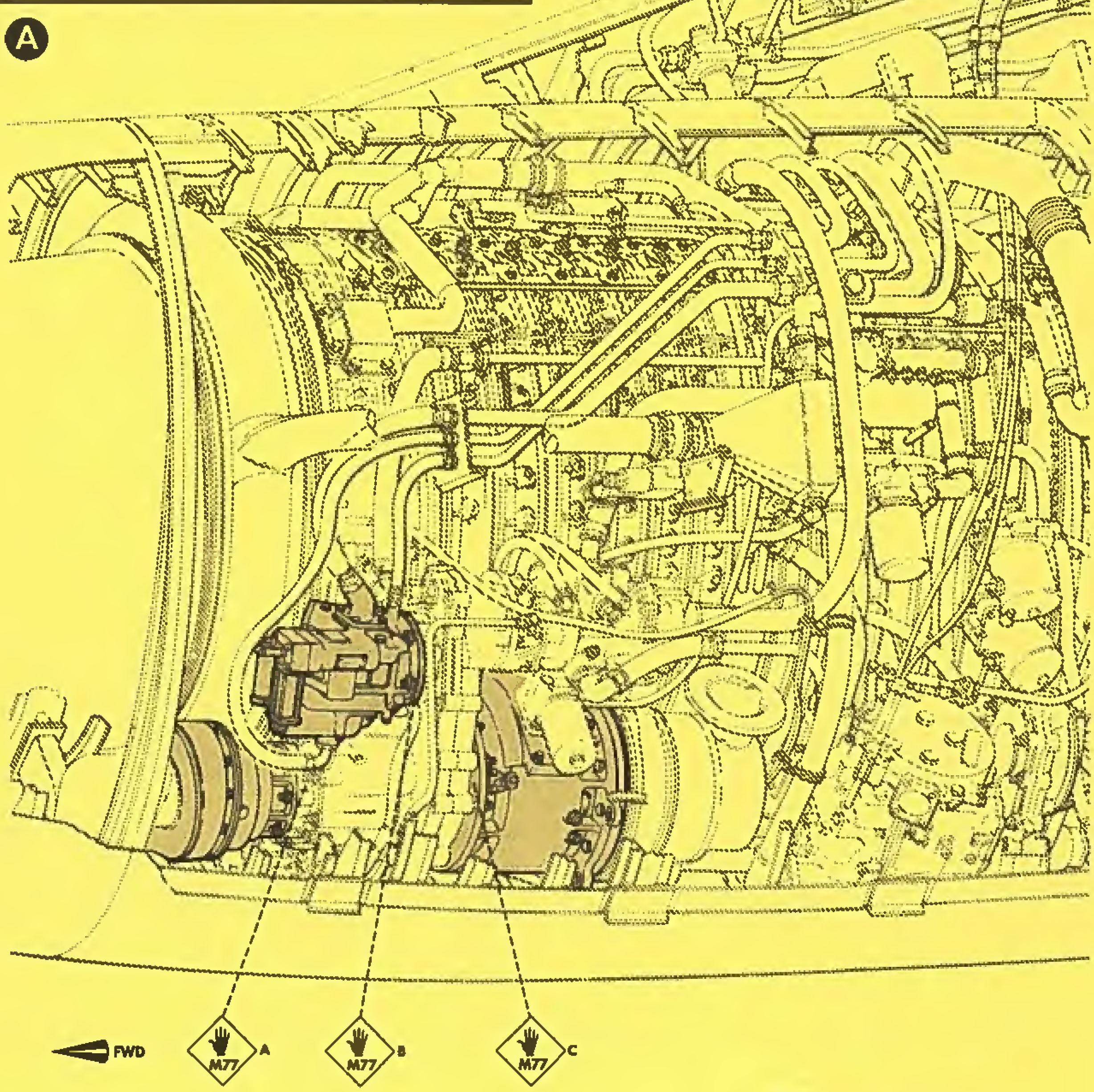


Rudder and Rudder Trim Tab
Control Rod End Bearings Lubrication
Figure 223

TEMPORARY REVISION NO. 12-14.
Insert following Temporary Revision 12-5 which follows 12-12-0, Page 229 **Basic** (no date).

This is an added illustration.

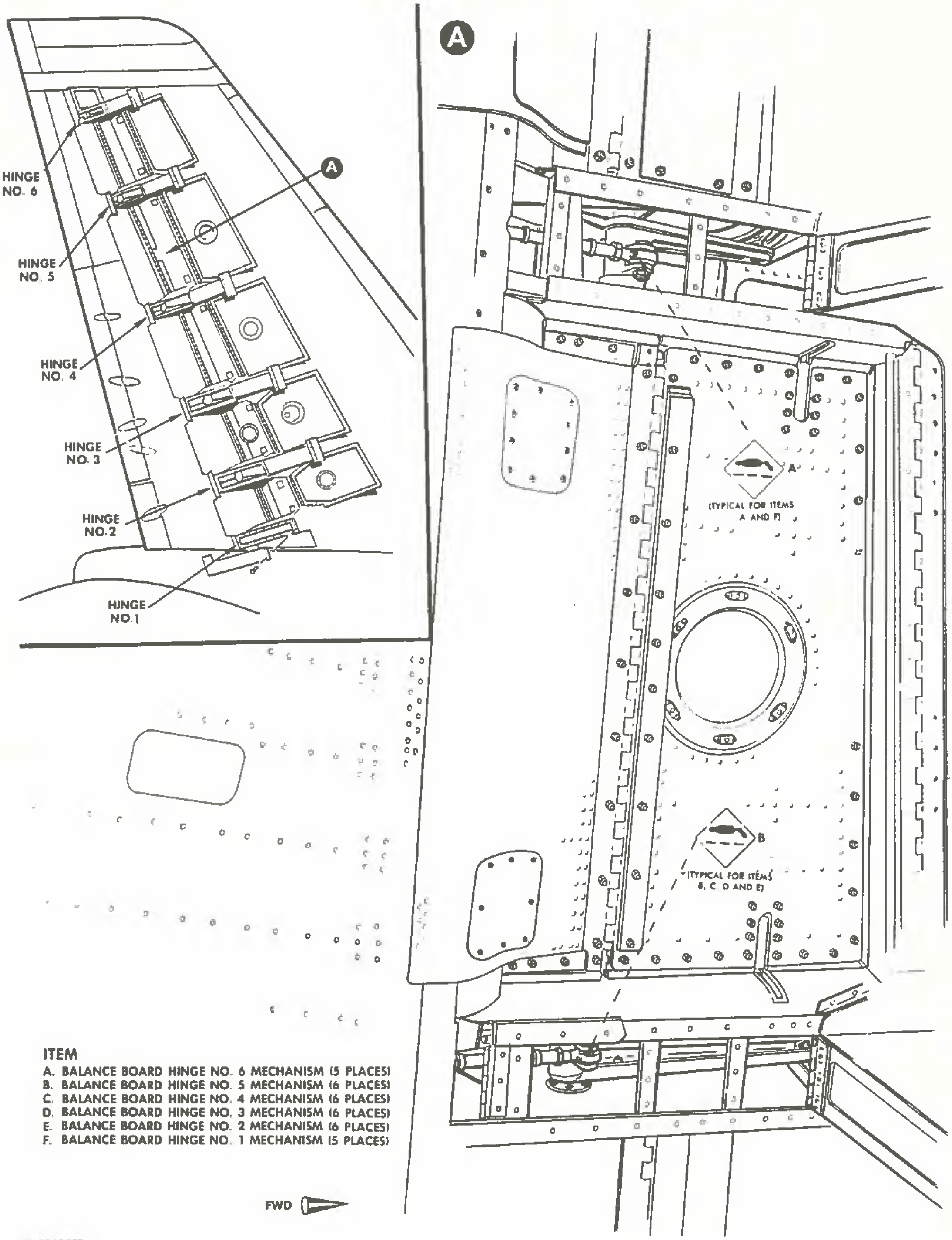




ITEM:
A. ENGINE STARTER-LUBRICATE SPLINE DRIVE SHAFT
B. ENGINE HYDRAULIC PUMP-LUBRICATE SPLINE DRIVE SHAFT
C. CONSTANT SPEED DRIVE-LUBRICATE SPLINE DRIVE SHAFT

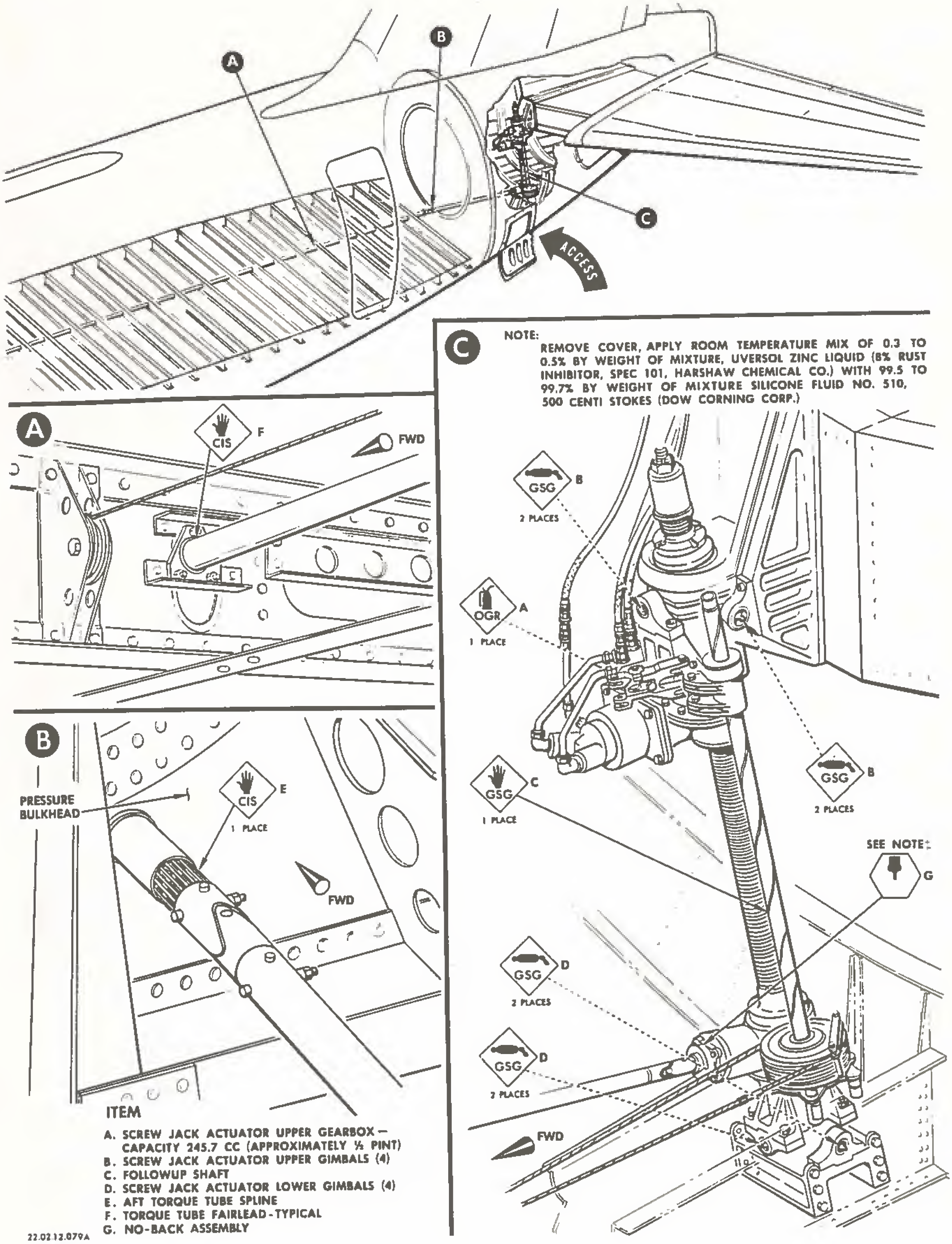
22.02.12.084

CSD Engine Starter, and Engine Hydraulic Pump Lubrication
Figure 226

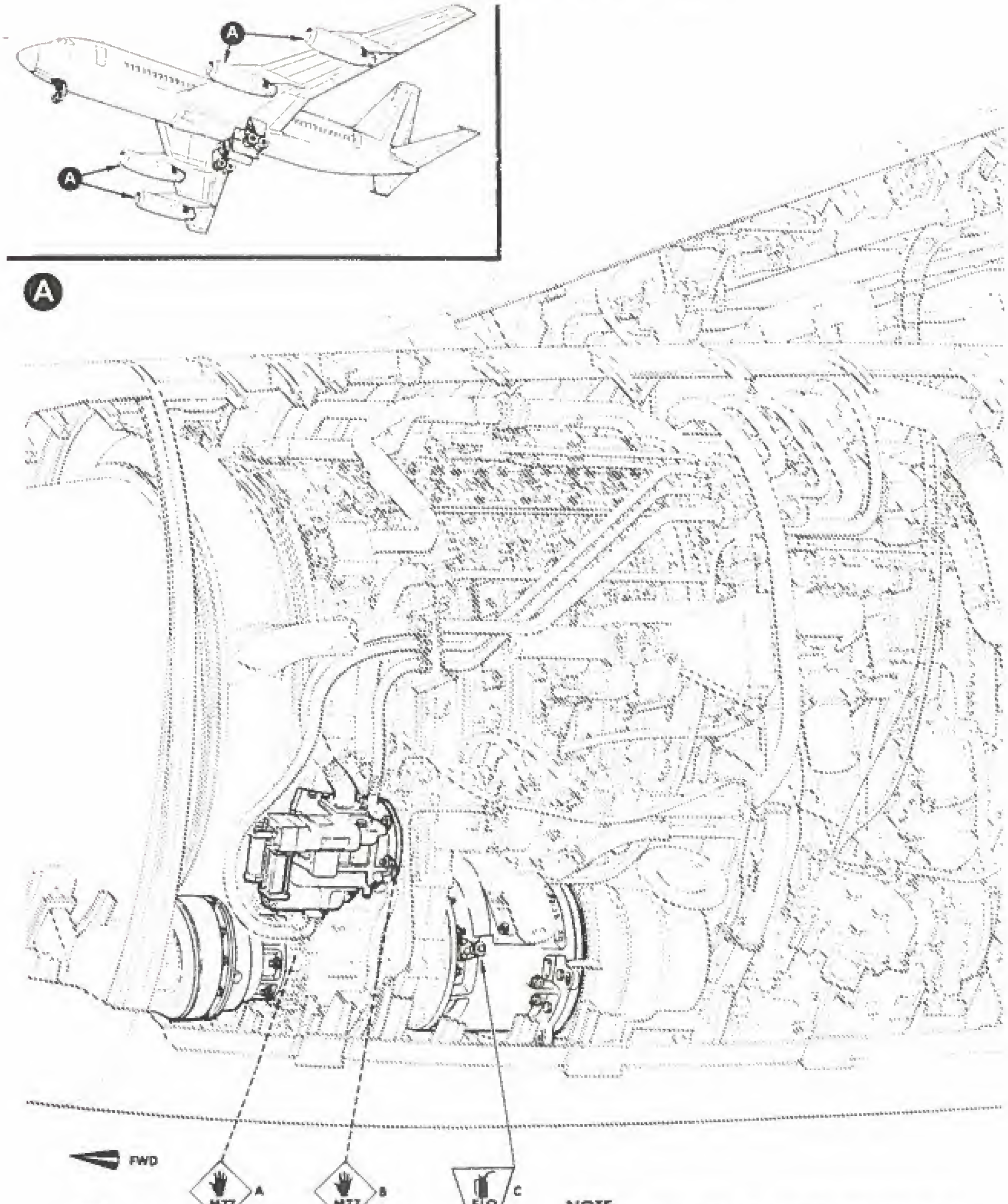


12.02.12.037

Rudder Balance Board Hinge and Hinge
Mechanism Lubrication
Figure 224



Horizontal Stabilizer Screw Jack Lubrication
Figure 225



ITEM:

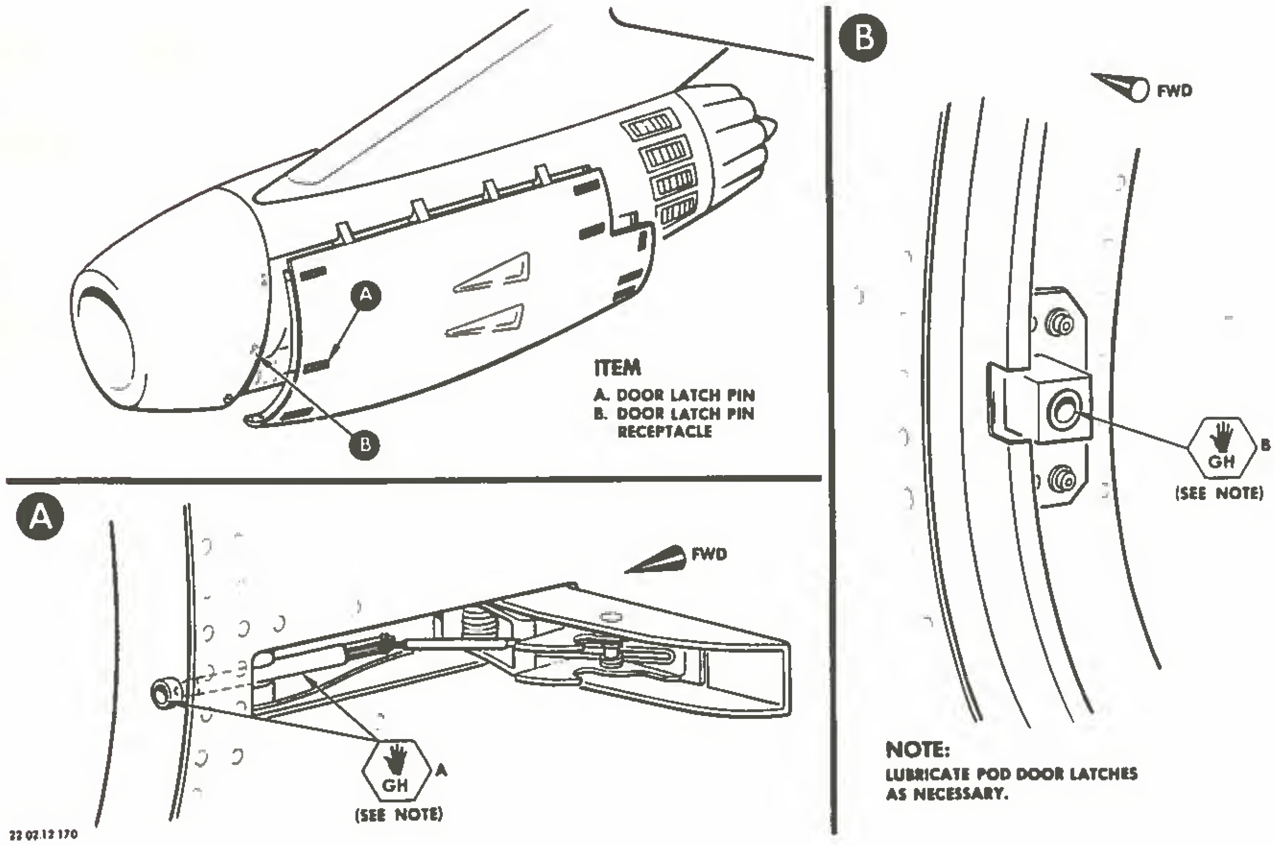
A. ENGINE STARTER—LUBRICATE SPLINE DRIVE SHAFT
B. ENGINE HYDRAULIC PUMP—LUBRICATE SPLINE DRIVE SHAFT
C. LUBRICATE CONSTANT SPEED DRIVE AS FOLLOWS:
   (1) REMOVE PLUG FROM FILLER TUBE AT INPUT END OF CONSTANT SPEED DRIVE.
   (2) FILL SLOWLY WITH OIL (MIL-L-7808) UNTIL OIL OVERFLOWS FROM FILLER SPOUT. CAPACITY OF UNIT IS APPROXIMATELY ONE QUART (800-900 cc.).
   (3) INSTALL PLUG IN FILLER TUBE AND SAFETY.

22 02 12 084 B

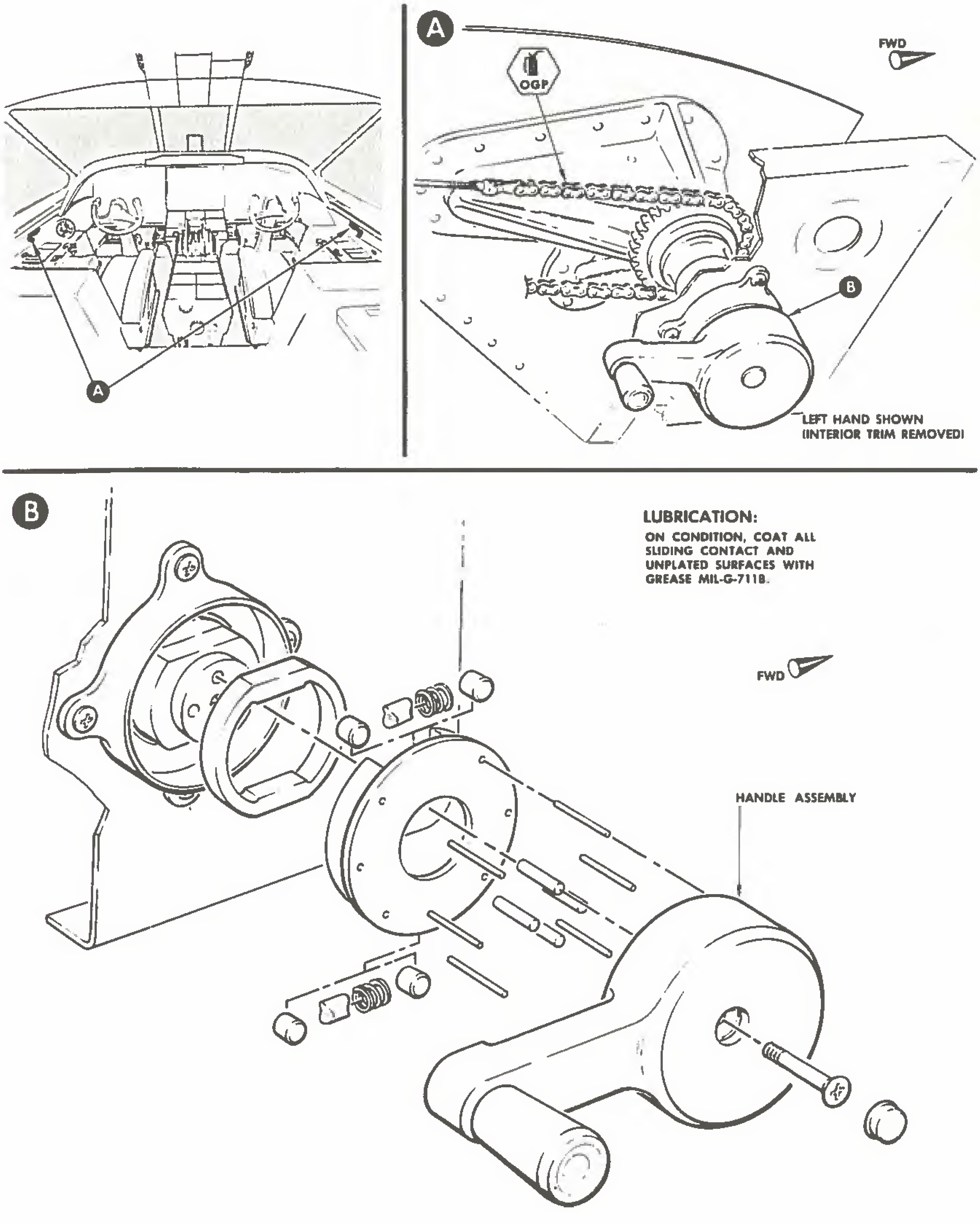
NOTE:
ON DRIVES THAT HAVE CHECK VALVES INSTALLED IN THE PORT OF THE DRAIN PLUG, FIRST REMOVE THE PLUG ON THE OIL FILLER TUBE THEN PRESSURE FILL THROUGH THE CHECK VALVE UNTIL THE OIL LEVEL IS AT THE TOP OF THE FILLER TUBE.

CAUTION:
FILL THE DRIVE SLOWLY TO PREVENT DAMAGE TO THE SEALS. PRIOR TO CHECKING THE OIL LEVEL, ALLOW THE OIL TO STABILIZE.

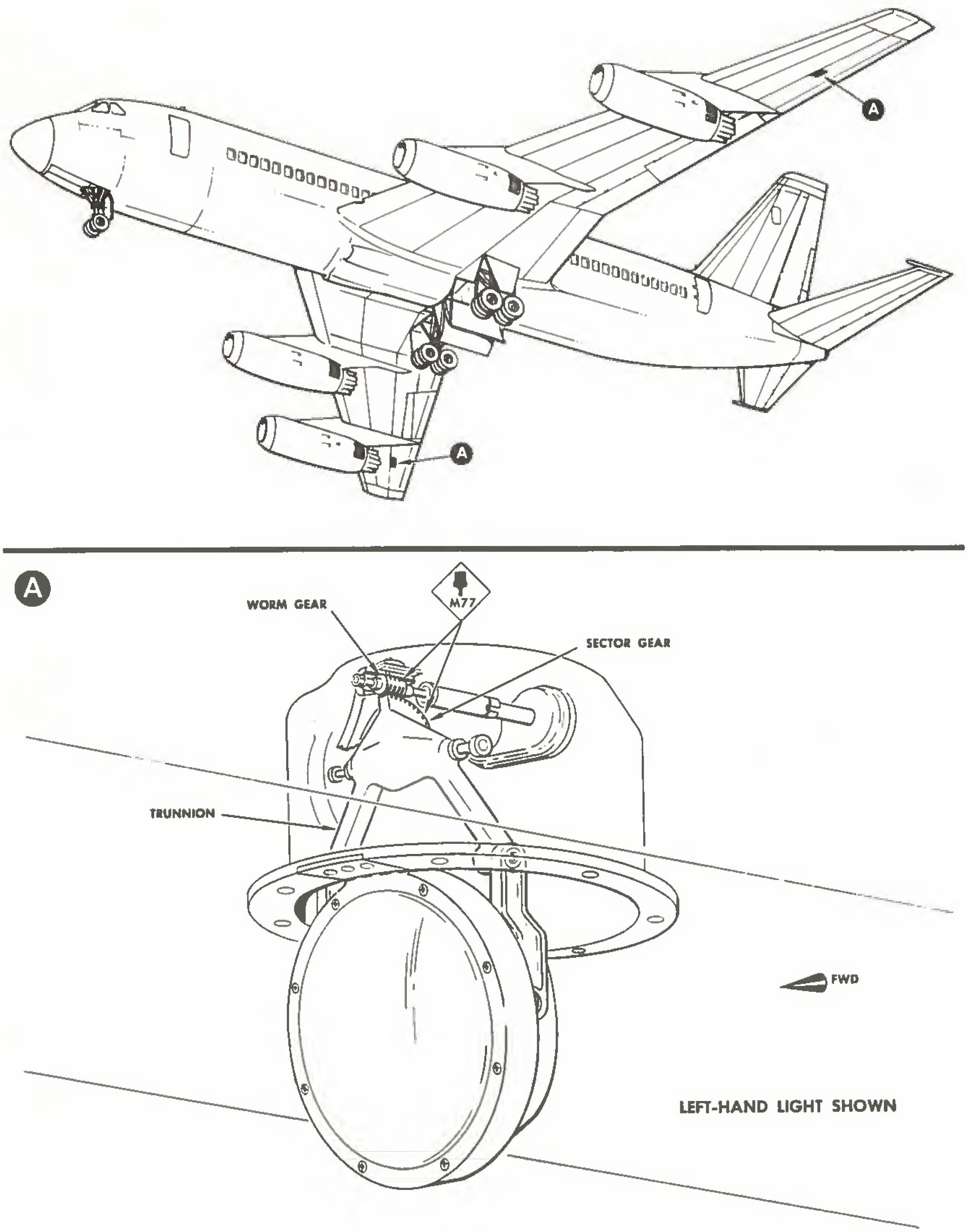
Constant Speed Drive, Engine Starter and
Engine Hydraulic Pump Lubrication
Figure 226



Engine Pod Door Latch Lubrication
Figure 227



Sliding Window Handle Lubrication
Figure 228



RETRACTABLE LANDING LIGHT

22.02.12.135

Retractable Landing Light Lubrication
Figure 229

LIST OF EFFECTIVE PAGES

Chapter 13
STANDARD PRACTICES - AIRFRAME

	CHAPTER	PAGE	DATE	CODE
*	13	i	Jan. 3/62	A-4
		BLANK		
*	13	1	Jan. 3/62	A-3
		BLANK		
	13-0	1	Nov. 4/60	A-1
		BLANK		
*	13-1-0	1	Jan. 3/62	A-2
*	13-1-0	2	Jan. 3/62	A-3
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*	13-1-0	4	Jan. 3/62	A-2
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*	13-1-0	17	Jan. 3/62	A-3
*	13-1-0	18	Jan. 3/62	A-4
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	13-2-2	2	Aug. 30/61	A
	13-2-2	3	Aug. 10/61	A
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	13-4-1	203	Aug. 10/61	A
	13-4-1	204	Aug. 10/61	A
	13-4-1	205	Aug. 10/61	A
	13-4-1	206	Aug. 10/61	A
	13-4-1	207	Aug. 10/61	A
		BLANK		

* Pages revised, added or deleted by this revision.

Chapter 13
STANDARD PRACTICES - AIRFRAME

TABLE OF CONTENTS

Chapter 13

STANDARD PRACTICES-AIRFRAME

1. General

Materials for use in maintenance of this airplane are listed in 13-1-0. The list provides information for procurement, and is designed with ample space for addition of new materials as they are approved for use in maintenance of the airplane.

Flareless tube fittings and tube assemblies are used in systems throughout the airplane. Installation procedure is presented in 13-2-0.

A table of standard torque values is provided in 13-3-0. Special torque values are specified in the applicable chapters of this manual

MAINTENANCE MATERIALS

1. General

Materials for use in maintaining the airplane are listed in the following pages. These materials, listed alphabetically in the MATERIAL column, have been given military specification numbers (MIL) when available; otherwise, their federal specification number, manufacturers number or product name is listed. The colors, flow rates, usages, shelf life periods, and applicable standard process specifications are also included. A blank column is provided for use by the customer.

Unless specific mixing instructions and curing times for paints, sealants, cements, etc., are given, all mixing and curing shall be accomplished as directed by the manufacturer on the kit label. Shelf life periods should be carefully observed and all over-age kits or partially used kits with illegible labels should be discarded.

SPECIFICATION OR MFG. NO.		MATERIAL	MANUFACTURER	COLOR	FLOW	USAGE	SHELF LIFE
HN 951		Accelerator	Shell Chemical Co. New York, N. Y.	- -	- -	Accelerates curing when mixed with Epon 828	- - -
- - -		Acid, Acetic	Local procurement	- -	- -	5 to 10% solution, neutralizes potassium hydroxide	- - -
- - -		Acid, Oxalic	Local procurement	- -	- -	10% solution, stain removal	- - -
Fed. Spec. 0-A-88		Acid, Nitric (Technical Grade)	Local procurement	- -	- -	1/2 fluid oz. per gal. of Turcoat 4178 solution	- - -
Fed. Spec. 0-C-303		Acid, Chromic	Local procurement	- -	- -	10% solution, corrosion treatment magnesium alloys	- - -
MIL-C-25378		Acid, Phosphoric	See Q.P.L.	- -	- -	Remove corrosion from aluminum clad	- - -
RTV Silastic 140		Adhesive	Dow Corning Corp. Midland, Mich.	- -	- -	Bonding fabric repair to pressure seal	- - -
EC 1751		Adhesive	3M Company St. Paul 6, Minn.	Clear	Liq.	Metal-to-metal repair patch on electrically heated leading edges	6 mo. 65°-90°F
610-1016		Adhesive, 2 parts	Granger Associates, Palo Alto, Calif.	- -	- -	Bonding static dischargers to metal surfaces	3 mo. 50°F-90°F

SPECIFICATION OR MFG. NO.		MATERIAL	MANUFACTURER	COLOR	FLOW	USAGE	SHELF LIFE
Narmco 3119		Adhesive, 2 part	Narmco Inc. San Diego, Calif.	Light Grey	Med	Bonding, skin and honeycomb repairs	6 mo. 50°-90°F
Narmco 3135		Adhesive, Epoxy	Narmco Inc. San Diego, Calif.	Clear	Med	Bonding, metal to metal	6 mo. 50°-90°F
4755		Adhesive	Los Angeles Standard Rubber Co. Los Angeles, Calif.	- -	- -	Repair pressure seals, (7004) dacron fabric coated with General Electric 555 Silicone	- - -
Shell 911F & 911M		Adhesive, Epoxy	Shell Chemical Co., Div. of Shell Oil Co., P.O. Box 831, Pittsburgh, Calif.	Yellow	Low	Bonding metal to metal	6 mo. 50°F-90°F
MIL-F-5566		Alcohol	See Q.P.L.	- -	- -	Stain removal, (tobacco)	- - -
MIL-A-6019		Alcohol, Denatured	See Q.P.L.	- -	- -	Clean O-ring seals	- - -
MIL-D-26937		Alkyl-Aryl Sulfonate	See Q.P.L.	- -	- -	0.05 oz. per gal. water, wetting agent prior to use of Chromic Acid	- - -
MIL-C-4343		Anti-Seize Compound	See Q.P.L.	- -	- -	Lubrication, threads	- - -
P-51		Anti-Seize Compound	Armite Laboratories, Los Angeles, Calif.	- -	- -	Lubrication, threads aluminum bolts	- - -

SPECIFICATION OR MFG. NO.		MATERIAL	MANUFACTURER	COLOR	FLOW	USAGE	SHELF LIFE
MIL-T-5542B		Anti-Seize Thread Compound	See Q.P.L. (Recommend Rectorseal #15 Only)	- -	- -	Lubrication, threads oxygen system tube fittings	- - -
MIL-T-5544		Anti-Seize Thread Compound	See Q.P.L.	- -	- -	Lubrication, threads landing gear wheel tie bolts	- - -
Turco 3002		Brightner Compound	Turco Products Inc., Newark, N.J.	- -	- -	Restore luster of unpainted surfaces	- - -
MIL-B-5612		Brush, Non-metallic	See Q.P.L.	- -	- -	Apply acids	- - -
MIL-L-25567		Bubble-Fluid	See Q.P.L.	- -	- -	Leak detection, oxygen system	- - -
MIL-S-4282		Bubble-Fluid	See Q.P.L.	- -	- -	Leak detection, general use	- - -
A-117		Cement, Silicone Base	Mystic Products Los Angeles 65, Calif.	White	Med	Bonding silicone rubber, teflon to metal-pressure sensitive	6 mo. 40°-50°F
T-161		Cement, Stabond	American Latex Products Corp. Los Angeles, Calif.	Clear	Liq.	Bonding, general (flexible)	6 mo. 60°-80°F
EC 870		Cement, Neoprene	3 M Company St. Paul 6, Minn.	Light Tan	Liq.	Bonding Neoprene	6 mo. 60°-80°F

SPECIFICATION OR MFG. NO.		MATERIAL	MANUFACTURER	COLOR	FLOW	USAGE	SHELF LIFE
1214		Cement, Polyur-ethane	Applied Plastics Corp. El Segundo, Calif.	Pale Yel-low	Liq.	Bonding vinyl fabric	1 year 40°F
EC 1300		Cement, Neoprene	3 M Company St. Paul 6, Minn.	Yel-low	High	Repairs to most materials tolerant to MEK	6 mo. 60°-90°F
EC 1357		Cement	3 M Company St. Paul 6, Minn.	Grey/ Green	High	Bonding insulation wood etc.	6 mo. 60°-80°F
EC 2063		Cement, Neoprene Latex	3 M Company St. Paul 6, Minn.	Amber	Liq.	Bonding fabric	4 mo. 60°-80°F
MIL-C-4003 Type II (EC 847)		Cement, Nitrile	3 M Company St. Paul 6, Minn.	Brown	Liq.	General sealing, minus 40 to plus 200 degrees F, resists oil, gasoline and water	6 mo. 60°-80°F
MIL-C-5540		Cement, Neoprene	See Q.P.L.	- -	- -	Bonding Neoprene	- - -
MIL-T-10168A (EC 833)		Cement, Rubber Base	3 M Company St. Paul 6, Minn.	Tan	High	Bonding, slow dry, minus 65 to plus 200 degrees F, resists water	8 mo.
Chorlastic RTV 319		Cement, Silicone Rubber	Connecticut Hard Rubber Co., New Haven, Conn.	- -	- -	Bonding door seal to retainer	6 mo. 40°-60°F

SPECIFICATION OR MFG. NO.		MATERIAL	MANUFACTURER	COLOR	FLOW	USAGE	SHELF LIFE
MIL-L-7178		Cellulose Nitrate	See Q.P.L.	Clear	Liq.	Lacquer coating, exterior surfaces, mix aluminum lacquer	1 year 60°-90° F
Fed. Spec. KK-S-416		Chamois	Local procurement	- -	- -	Drying surface after washing	- - -
- - -		Cleaner, Ke-Clean	Kalite, P.O. Box 2917 Terminal Annex, Los Angeles, Calif.	- -	- -	Cleaning paint, leather and vinyl surfaces	
- - -		Cleaner (Foam)	E. I. Dupont de Nemours, Inc.			For shampooing upholstery	
- - -		Dupont Clean	E. I. Dupont de Nemours, Inc.			For removing oil spots. Requires adequate ventilation	
- - -		Cleaner, Mystic Foam	Mystic Foam Corp. Cleveland, Ohio	- -	- -	Cleaning rugs and upholstery	- - -
- - -		Cleaner, Surfa-Saver	Fischer Industries Inc., Cincinnati, Ohio	- -	- -	Cleaning universal	- - -
- - -		Cleaner, Vitol	Turco Products Corp. Los Angeles, Calif.	- -	- -	Cleaner universal	- - -
1497		Cleaner, Turco	Turco Products Corp. Los Angeles, Calif.	- -	- -	Cleaning stainless steel and satin aluminum	- - -
		Cleaner, Turco Plaudit	Turco Products Corp. Los Angeles, Calif.	- -	- -	Remove heavy carbon from underside epoxy painted wings	- - -

SPECIFICATION OR MFG. NO.		MATERIAL	MANUFACTURER	COLOR	FLOW	USAGE	SHELF LIFE
- - -		Cloth, Cheese	Local procurement	- -	- -	Cleaning general	- - -
- - -		Cloth, Flannel	Local procurement	- -	- -	Cleaning general	- - -
453-1-1		Coating, Anti-static Cat-A-Lac	Finch Paint and Chemical Co. Los Angeles, Calif.	Black	Liq.	Radome and antenna coating	1 year
EC 776		Coating, Nitrile	3 M Company St. Paul 6, Minn.	Red	Liq.	Fuel tank repair coating	6 mo. 40°-75°F
376		Conditioner, (with wetting agent added)	Tec Chemical Co. Monterey Park, Calif.	- -	- -	Surface preparation prior to application of Epoxy	- - -
MIL-T-713 Type 5 Comp B Class II		Cord, Nylon	See Q.P.L.	- -	- -	Installation of insulation blankets	- - -
MIL-C-5040 Type III		Cord, Nylon	See Q.P.L.	- -	- -	Lacing center fuel cells to structure	- - -
- - -		Corn Starch	Local procurement	- -	- -	Blood stain removal, make paste with water	- - -
Oakite A-202		Detergent (Aero-Det)	Local procurement	- -	- -	Remove foreign matter from airframe	- - -
20		Detergent (Emulso-Clean)	Cee Bee Chemical Co. Downey Calif.	- -	- -	Remove foreign matter from airframe	

SPECIFICATION OR MFG NO.		MATERIAL	MANUFACTURER	COLOR	FLOW	USAGE	SHELF LIFE
- - -		Detergent (Electro-Sol)	Economics Lab. Inc. 722 S. Western Ave. Los Angeles, Calif.	- -	- -	Cleaning general, (buffets)	- - -
MIL-D-3464		Dessicant	See Q.P.L.			Dehumidifying packaged materials	Indicator card must show dark blue
- - -		(Disinfectant) Degerm	Century Chemical Product Co. 520 W. Fort St. Detroit, Mich.	- -	- -	Solution for degerming waste tanks	- - -
- - -		Dry Ice	Local procurement	- -	- -	Testing sensors, anti-ice system	- - -
MIL-I-25135		Dye-penetrant	See Q.P.L.	- -	- -	Inspection for cracks, skins, etc.	- - -
Fed. Spec. AMS3120B		Enamel Glyceryl Phthalate	Local procurement	Black	Liq.	Finish, machinery	- - -
7X938		Enamel, Sicon	Midland Industrial Finishes, Waukegan, Ill.	Black	Liq.	Touch-up high temperature areas	1 year
MIL-E-7729		Enamel	See Q.P.L.	Red	Liq.	Mark airplane tire and wheel to determine slippage in service	1 year 60^{o}-$90^{o}F$

SPECIFICATION OR MFG. NO.		MATERIAL	MANUFACTURER	COLOR	FLOW	USAGE	SHELF LIFE
A - 423, Type II		Epoxy, Moly Black	Andrew Brown Co., Los Angeles, Calif.	Black	Liq.	Chafe preventive coating for service door sliding tracks and cable drum grooves	1 year 70^{o}-$90^{o}F$
A 423		Epoxy, Top Coat	Andrew Brown Co. Los Angeles, Calif.	White / Black	Liq.	Exterior finish-white door frames-	1 yr. 60^{o}-$90^{o}F$
M11060		Fabric, Patching	Air Cruiser Inc. Clifton, N.J.	- -	-	Evacuation slide repair fabric	- - -
4755		Fabric, Dacron Patch	Los Angeles Standard Rubber Co., Los Angeles, Calif.	- -	- -	Repair service door pressure seal	- - -
181		Fiberglas material	Local procurement	- -	- -	Trim panel repairs, large areas	- - -
S-30		Fluorolube	Hooker Electro Chemical Co., Niagra Falls, N. Y.	- -	- -	Lubrication, oxygen system pneumatic valve	- - -
Freon 114		Freon	Local procurement	- -	- -	Charge air conditioning system	- - -
MIL-F-5624A		Fuel, JP 4	See Q.P.L.	- -	- -	Engine fuel	- - -
- - -		Glycerin	Local procurement	- -	- -	Stain removal, tobacco	- - -
- - -		Grease, Elf lube-stick	Aviation Lubricants Co., San Diego, Calif.	- -	- -	Lubrication, door hinge and latch	- - -

SPECIFICATION OR MFG. NO.		MATERIAL	MANUFACTURER	COLOR	FLOW	USAGE	SHELF LIFE
Royco-5N		Grease, High Temperature	Royal Engineering Co. East Hanover, N.J.	- -	- -	Lubrication, wheel bearings	- - -
MIL-G-7118A		Grease	See Q.P.L.	- -	- -	Lubrication, gears general	- - -
MIL-G-7187		Grease, Graphite	See Q.P.L.	- -	- -	Lubrication, general	- - -
MIL-G-7421		Grease, Extreme Low Temperature	See Q.P.L.	- -	- -	Lubrication, rol-lers, linkages, etc.	- - -
MIL-L-3545		Grease, High Tem-perature	See Q.P.L.	- -	- -	Lubrication, wheel bearings	- - -
MIL-G-7711		Grease	See Q.P.L.	- -	- -	Lubrication, general	- - -
MIL-G-25013C		Grease, Silicone Base	See Q.P.L.	Blue	- -	Lubrication, tele-flex engine control cables	- - -
MIL-G-25760		Grease, Wide Temp. Range	See Q.P.L.	- -	- -	Lubrication, ball and roller bearings	- - -
CC-1121		Lacquer	Andrew Brown Co. Los Angeles, Calif.	Grey Green	Liq.	Touch-up instrument panels	1 year
MIL-L-6805		Lacquer	See Q.P.L.	Black	Liq.	General purpose	- - -
- - -		Merthiolate	Local procurement	- -	- -	Disinfect oxygen masks	- - -

TEMPORARY REVISION NO. 13-1.

Insert facing 13-1-0, Page 10 dated Nov. 4/60.

This information supersedes the information on page 10.

SPECIFICATION OR MFG. NO.	MATERIAL	MANUFACTURER	COLOR	FLOW	USAGE	SHELF LIFE
MIL-L-6085A	Oil	See Q.P.L.	- -	- -	Turbocompressor sump instrument lube	- -
MIL-L-6086A	Oil, Grade I	See Q.P.L.	- -	- -	Lubrication, gear low temperature	- -
MIL-L-7808	Oil	See Q.P.L.	- -	- -	Freon compressor lubricant (PNEUMATIC DRIVEN ONLY)	- -
Fed. Spec. VV-L-820	Oil	Texaco Capella AA Oil	- -	- -	Freon compressor lubricant (ELECTRIC DRIVEN ONLY)	- -
MIL-L-7808C	Oil	See Q.P.L.	- -	- -	Engine lubrication oil	- -
MIL-L-7870A	Oil	See Q.P.L.	- -	- -	Lubrication general purpose	- -
- - -	Paper, Abrasive Aluminum Oxide	Local procurement	- -	- -	200 thru 800 grit-smooth nicks from metal	- -
- - -	Paper, Emery Wet-or-Dry	Local procurement	- -	- -	140 grit-smooth paint and plastic repairs 600 grit-remove nicks from windows	- -
Fed. Spec. TT-A-468 Type II Class A	Paste, Aluminum	Local procurement	- -	- -	Aluminum lacquer pigment	- -

SPECIFICATION OR MFG. NO.		MATERIAL	MANUFACTURER	COLOR	FLOW	USAGE	SHELF LIFE
M-77A		MolyKote, Silicone	Alpha MolyKote Corp. Stamford, Conn.	- -	- -	Lubrication, drive Shaft splines	- - -
- - -		Nitrogen, Dry	Local procurement	- -	- -	Pressurizing systems for test	- - -
MIL-H-5606		Oil, Hydraulic Petroleum Base	See Q.P.L.	- -	- -	Lubrication, gear boxes, truck positioners etc.	- - -
MIL-O-6081B		Oil, 1010	See Q.P.L.	- -	- -	Engine preservation	- - -
MIL-H-6083		Oil, Hydraulic	See Q.P.L.	- -	- -	Lubricate main landing gear shock strut	- - -
MIL-L-6085A		Oil	See Q.P.L.	- -	- -	Turbocompressor sump instrument lube	- - -
MIL-L-6086A		Oil, Grade I	See Q.P.L.	- -	- -	Lubrication, gear low temperature	- - -
MIL-L=7808		Oil	See Q.P.L.	- -	- -	Freon compressor lubricant (PNEUMATIC DRIVEN ONLY)	- -
Fed. Spec. VV-L-820		Oil	Texaco Capella AA Oil	- -	- -	Freon compressor lubricant (ELECTRIC DRIVEN ONLY)	- -
MIL-L-7808C		Oil	See Q.P.L.	- -	- -	Engine lubrication oil	- -
MIL-L-7870A		Oil	See Q.P.L.	- -	- -	Lubrication general purpose	- -

SPECIFICATION OR MFG. NO.		MATERIAL	MANUFACTURER	COLOR	FLOW	USAGE	SHELF LIFE
- - -		Paper, Abrasive Aluminum Oxide	Local procurement	- -	- -	200 thru 800 grit-smooth nicks from metal	- -
- - -		Paper, Emery Wet-or-Dry	Local procurement	- -	- -	140 grit-smooth paint and plastic repairs 600 grit-remove nicks from windows	- -
767 SWA-7885 (30-40)		Paper, Waxed Moisture Barrier	Zellerback Div. Shufford Mills, Hickory, N.C.	- -	- -	Masking airframe for cleaning and painting	
Fed. Spec. TT-A-468 Type II Class A		Paste, Aluminum	Local procurement	- -	- -	Aluminum lacquer pigment	- - -
RL 3868		Paste, Zinc Chromate	W.P. Fuller Co., San Francisco, Calif.	- -	- -	Sealing water valve gaskets	- - -
Fed. Spec. VV-P-236		Petrolatum	Local procurement	- -	- -	Lubrication general	- - -
		Polishing pads (Easy Shine)	Cee Bee Chemical Co. Downey, Calif.	- -	- -	Restore painted surface luster	- - -
MIL-C-8514		Primer, Wash 2 Part	See Q.P.L.	Tan	Liq.	Preprime- Not for Skydrol areas	1 year

SPECIFICATION OR MFG. NO.		MATERIAL	MANUFACTURER	COLOR	FLOW	USAGE	SHELF LIFE
EC 1662		Primer, Sealants	3 M Company St. Paul 6, Minn.	Red	Liq.	Treat metal surfaces prior to sealant application	6 mo. 40°-50°F
Convair Spec. o-03021		Primer, Epoxy Enamel	Andrew Brown Co. Los Angeles, Calif.	Light Yel-low	Liq.	Skydrol area primer, Finish over sealants	1 yr. 60°-90°F
Fed. Spec. AMS 3110C		Primer, Zinc Chromate	Local procurement	- -	- -	Primer prior to Glyceryl Phthalate application	- - -
MIL-P-8585		Primer, Zinc Chromate	See Q.P.L.	Yel-low Green	Liq.	Primer, general under lacquer finish	1 year
MIL-P-15328		Primer, Wash 2 Part	See Q.P.L.	Clear	Liq.	Exterior surfaces & magnesium alloy	1 year
MIL-C-16173 Grade 1		Preserva-tive, Paralketone	See Q.P.L.	Dark Brown Opaqu	Med	Engine control cables and general use - Grade 4 alternate	1 year 60°-90°F
MIL-C-16173 Grade 3		Preserv-ative	See Q.P.L.	Black Brown	Liq.	Water displacing soft film at remov-able, bolted alumi-num fittings	- - -
MIL-C-8188		Preserv-ative	See Q.P.L.	- -	- -	Preservation of engine	- - -
MIL-M-3171A Type I		Process, protective treatment	See Q.P.L.	- -	- -	Repair pickle for magnesium	- - -

SPECIFICATION OR MFG. NO.		MATERIAL	MANUFACTURER	COLOR	FLOW	USAGE	SHELF LIFE
MIL-C-5541		Process, Alodine 1200 System	- - -	- -	- -	Aluminum surface corrosion treatment (will stain aluminum)	- -
MIL-L-6880		Process, Lubrication	- - -	- -	- -	Methods of lubrication	- - -
MIL-F-7179		Process, Protective finish	- - -	- -	- -	Finish requirements for exterior surface protection	- - -
MS33540		Process, Lockwiring	- - -	- -	- -	Methods for safety wiring	- - -
467-2		Putty, Cat-A-Lac	Finch Paint & Chemical Co. Los Angeles, Calif.	White	Low	Filler plastic surfaces	1 year
Epon 828		Resin	Shell Chemical Co. New York, N.Y.	Lt. Tan	High	Repair plastics & potting	6 mo. 32°-80°F
		Rubbing Compound, Parko K-R	Parko Pacific Co. Gardena, Calif.	- -	- -	Restore painted surface luster	- - -
576-1		Sealer, Permagum	Hubbard Corp. Los Angeles, Calif	White	Low	Sealing floor joints lav and buffet areas	1 year
777		Sealer, Polyurethane	Coast Pro-Seal Mfg.Co. Los Angeles, Calif.	Lt. Tan	High	Potting compound, general use	3 mo. 40°-50°F

SPECIFICATION OR MFG. NO.		MATERIAL	MANUFACTURER	COLOR	FLOW	USAGE	SHELF LIFE
EC 801		Sealer, Synthetic Rubber	3 M Company St. Paul 6, Minn.	Black	Med	Sealing rain erosion shoe	3 mo. 40°-50°F (unmixed)
C-875		Sealer, Stabond	American Latex Products Corp. Los Angeles, Calif.	Grey	Low	Pressure & weather-tight seal - Not for Skydrol areas	18 mo. 40°-60°F
EC 1291		Sealer, Thiokol	3 M Company St. Paul 6, Minn.	Tan	High	Faying surfaces & injection sealer - Not for Skydrol areas	3 mo. 40°-50°F
EC 1293		Sealer, Thiokol	3 M Company St. Paul 6, Minn.	Lt. Tan	Med	Fillet sealer 275 degrees or less - Not for Skydrol areas	3 mo. 40°-50°F
PR 1436		Sealer, Thiokol	Products Research Co. Burbank, Calif.	Grey	Low	Fairing compound	6 mo. 60°-80°F
EC 1663		Sealer, Silicone Rubber	3 M Company St. Paul 6, Minn.	Red	High	Faying surfaces - Skydrol & high temp areas	6 mo. 40°-50°F
EC 1667		Sealer, Silicone Rubber	3 M Company St. Paul 6, Minn.	Red	Low	Fillet sealing - Skydrol & high temp areas	6 mo. 40°-50°F
MIL-I-8860		Sealer	See Q.P.L.	- -	Low	DC-4 grease for insulation and sealer	- - -

SPECIFICATION OR MFG. NO.		MATERIAL	MANUFACTURER	COLOR	FLOW	USAGE	SHELF LIFE
		Sealer, Wax	Karseal Corp. Hollywood, Calif.	- -	- -	Sealing nose cowl & bleed air ducts	- - -
Cabosil M-5		Silica Pellets	Shell Chemical Co. New York, N.Y.	- -	- -	Plastic repairs - Mix with Epon 828	- - -
Skydrol 500A		Skydrol, Hydraulic Fluid	Monsanto Chemical Co. St. Louis, Mo.	Pur- ple	High	Fill hydraulic system	- - -
- - -		Soap, Castile	Local procurement	- -	- -	Cleaning general	- - -
- - -		Soap, Iron Rust	Local procurement	- -	- -	Spot removal, (fabric)	- - -
- - -		Soap, Orvis Paste	Merchants Chemical Co. New York, N.Y.	- -	- -	Cleaner, rug, uphol- stery, seat belts and shoulder harness	- - -
- - -		Soapstone (or Talc)	Local procurement	- -	- -	Dust evacuation slide	- - -
- - -		Spot Remover Perchlor- ethlene	Dow Chemical Co. Midland, Mich.	- -	- -	Clean spots from rugs & upholstery	- - -
- - -		Spot Remover Pro-Fesh	Pro-Fesh Products Newark, New Jersey	- -	- -	Remove oil stains from rugs & upholstery	- - -
- - -		Spot Remover Turco-Solv	Turco Products Co. Los Angeles, Calif.	- -	- -	Remove oil stains from rugs & upholstery	- - -

SPECIFICATION OR MFG. NO.		MATERIAL	MANUFACTURER	COLOR	FLOW	USAGE	SHELF LIFE
- - -		Sodium Fluoride	Local procurement	- -	- -	2% solution removes ink stains from rugs upholstery etc.	- - -
- - -		Sodium Hypo-chlorite	Local procurement	- -	- -	Disinfectant for water tanks	- - -
TS-1		Solvent	Shell Chemical Co. New York, N.Y.	- -	- -	Clean windows	- - -
Remover "H"		Solvent	Tec Chemical Co. Monterey Park, Calif.			Cleaning/Painting surfaces on alumi-num alloy	
Fed. Spec. TT-N-95a		Solvent Aliphatic Naphtha	Local procurement	- -	- -	General use	- - -
Fed. Spec. TT-M-261		Solvent, Methyl Ethyl Ketone	Local procurement	- -	- -	Solvent for plastics and most cements	- - -
Fed. Spec. P-S-661B		Solvent	Local procurement	- -	- -	Hand cleaning of parts, general	- - -
Fed. Spec. AMS 3160A		Solvent	Local procurement	- -	- -	Clean surface prior to application of Glyceryl Phthalate	- - -
MIL-T-7003		Solvent, Trichlor-ehtylene	See Q.P.L.	- -	- -	Cleaning electrical parts and general cleaning (TOXIC)	- - -

SPECIFICATION OR MFG. NO.		MATERIAL	MANUFACTURER	COLOR	FLOW	USAGE	SHELF LIFE
- - -		Solvent, Acetone	Local procurement	- -	- -	Solvent for plastics EC 1300 etc.	- - -
- - -		Solvent, Amylacetate	Local procurement	- -	- -	Removing nail polish stains	- - -
- - -		Solvent, Carbon Tetra-chloride	Local procurement	- -	- -	Cleaning electrical parts (TOXIC)	- - -
Brolite 25		Solvent	Andrew Brown Co. Los Angeles, Calif.	- -	- -	Remove soil exterior unpainted surfaces	- - -
- - -		Solvent, Renuzit	Central Paint & Varnish Works Brooklyn, N.Y.	- -	- -	Cleaning flow sensor probes air conditioning system	- - -
Kelite # 14		Solution	Kelite Corp. Los Angeles, Calif.	- -	- -	Cleaning heat exchanger core	- - -
19A		Stripper, E Z Strip	Pennsalt Chemical Corp. Los Angeles, Calif.	- -	- -	Strip Epoxy paint from steel MLG, hor. stab. pivot bearings, steel bolts etc.	- - -
A202		Stripper, Cee Bee	Cee Bee Chemical Co. Inc. Los Angeles, Calif.	- -	- -	Strips Epoxy paint - Not for use on MLG, steel bolts, spindles etc.	- - -
MIL-R-8633		Stripper, Paint	See Q.P.L.	- -	- -	General use	- - -

SPECIFICATION OR MFG. NO.		MATERIAL	MANUFACTURER	COLOR	FLOW	USAGE	SHELF LIFE
50		Tape, double faced	Permacel Tape Corp. New Brunswick, N.J.	- -	- -	Rug installation	- - -
69		Tape	Permacel Tape Corp. New Brunswick, N.J.	- -	- -	Sealing general	- - -
150		Tape, double faced	Bauer and Black Chicago, Ill.	- -	- -	Insulation blankets, rugs etc.	- - -
328		Tape, Aluminum Foil	3 M Company St. Paul 6, Minn.	- -	- -	Sound deadening pressure bulkhead	- - -
BT 1218		Tape, Aluminum (pressure sensitive)	Buel-Town Co. San Diego, Calif.	Black matte	- -	Lightening arrestor strips on radome	- - -
428		Tape, Type "B" & "C"	3 M Company St. Paul 6, Minn.	- -	- -	Sound deadening general	- - -
549		Tape, Teflon	3 M Company St. Paul 6, Minn.	- -	- -	Masking prior to sealant application	
JAN-P-127		Tape, Type I	See Q.P.L.	- -	- -	Hold parts while adhesive cures	- - -
472		Tape, Vinyl (Pressure Sensitive)	3 M Company St. Paul 6, Minn.	- -	- -	General sealing	- - -

SPECIFICATION OR MFG. NO.		MATERIAL	MANUFACTURER	COLOR	FLOW	USAGE	SHELF LIFE
TH-18		TEMP-R-TAPE	Connecticut Hard Rubber Co., New Haven, Conn.	- -	- -	Chafing strip around windows	- - -
		Teflon Clear Epoxy	Andrew Brown Co. Los Angeles, Calif.	Clear	Liq.	Chafe preventive coating for contacting areas of fairings, control surfaces, etc.	- - -
Fed. Spec. AMS 3180B		Toluol	Local procurement	- -	- -	Thinner, Silicon Enamel	- -
Fed. Spec. TT-T-548		Toluene	Local procurement	- -	Liq.	Thinner, zinc chromate primer MIL-P-8585	- - -
Turcoat 4178		Turcoat Solution (3 oz/gal water)	Turco Products Los Angeles, Calif.	- -	- -	Touch-up aluminum alloy, engine	- - -
MIL-W-3688 (5015)		Wax, Clear without silicone oil ingredient	S.C. Johnson & Son Inc., Racine, Wisc.	- -	- -	Surface protection, unpainted aluminum and under wing	1 year 60°-90°F
Fullerine # 2		Wax	W.P. Fuller Co. San Francisco, Calif.	- -	- -	Sealing ducts	- - -

SPECIFICATION OR MFG. NO.		MATERIAL	MANUFACTURER	COLOR	FLOW	USAGE	SHELF LIFE
		Wax, Pride	S.C. Johnson & Son Inc., Racine, Wisc.	- -	- -	Polishing general, (Interior use)	- - -
MIL-A-4864		Wool Aluminum	See Q.P.L.	- -	- -	Removing corrosion	- - -

FLARELESS TUBE FITTINGS AND TUBE ASSEMBLIES

1. General

Installation, tightening, and testing procedures for flareless tubing assemblies is presented in this section.

FLARELESS TUBE FITTINGS AND TUBE ASSEMBLIES - MAINTENANCE PRACTICES

1. Installing and Tightening Flareless Tube Assemblies (See Figure 201)

   A. Equipment Required - None.

   B. Preparation Prior to Installation.

      (1) Visually check tube assembly parts: sleeve, nut, tube, and connector for nicks, burrs, and foreign particles.

      NOTE: Slight collapse of tube (under sleeve) is permissable providing tube assembly is otherwise acceptable.

      (2) Dress-out small nicks or burrs and clean parts using the method and solvent approved for the system from which tube was removed.

      (3) Lightly lubricate exterior of sleeve and connector fitting threads with one of the following:

      Hydraulic Fluid, Skydrol 500A, for hydraulic system.
      Anti-seize Compound, MIL-G-4343, for pneumatic system.
      Hydraulic Fluid (petroleum base), MIL-H-5606, for fuel system.
      Lubricating Oil, MIL-L-7808C, for engine oil system.
      Anti-seize Thread Compound, MIL-T-5542 (Rectorseal #15 only), for oxygen system.

      CAUTION: SPARINGLY APPLY ONLY THE LUBRICANT SPECIFIED ABOVE. REFER TO CHAPTER 35, OXYGEN, AND READ CAUTIONS THAT APPLY BEFORE LUBRICATING PARTS OF THE OXYGEN SYSTEM.

   C. Install and Tighten Flareless Tube.

      (1) Insert tube into connector fitting and start nut by hand.

      (2) Tighten nut with wrench until a sharp rise in torque is noticed. (This indicates that sleeve is in full contact with connector fitting.)

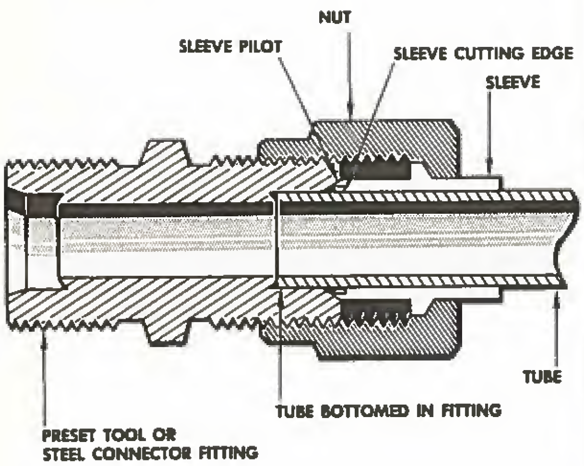
      (3) Continue tightening with wrench until a second rise in torque is noticed, or to a maximum of one-third turn more from the point of the first torque rise, whichever occurs first.

      CAUTION: DO NOT OVERTIGHTEN.

   D. Testing Flareless Tube Fittings and Tube Assemblies.

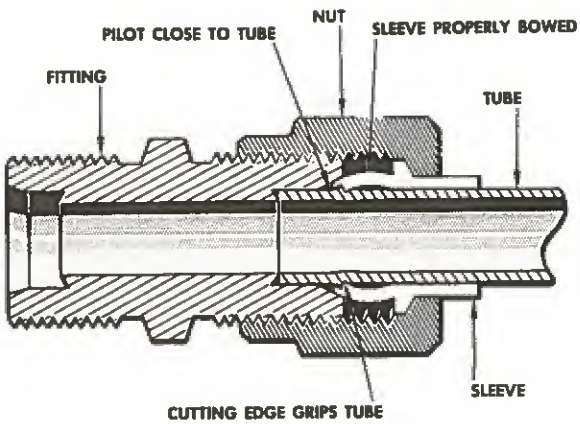
      (1) Test tube fittings and tube assemblies using procedures applicable to the system and mark any leaks found.

A



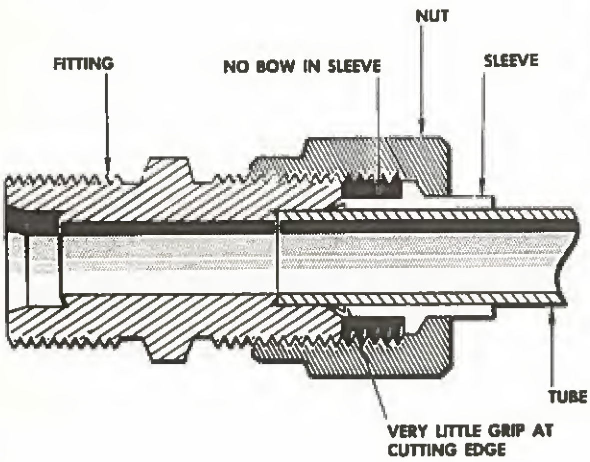
FLARELESS TUBE ASSEMBLY AND FITTING BEFORE PRESETTING

B



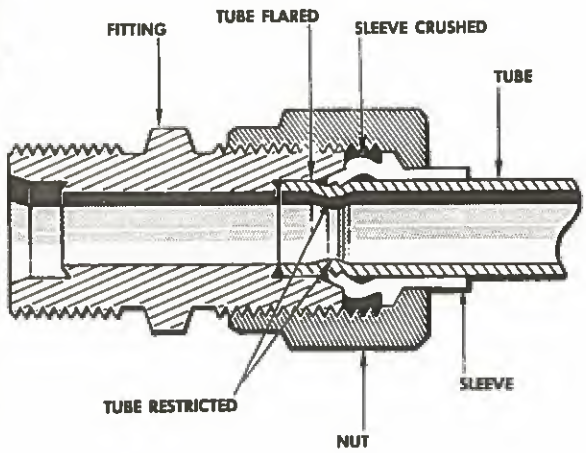
FLARELESS TUBE ASSEMBLY AND FITTING PROPERLY PRESET OR ASSEMBLED

C



FLARELESS TUBE ASSEMBLY AND FITTING IMPROPERLY PRESET—UNDERTIGHTENED

D



FLARELESS TUBE ASSEMBLY AND FITTING IMPROPERLY PRESET OR IMPROPERLY ASSEMBLED—OVERTIGHTENED

22.02.29.043

Flareless Tube Assembly Installation
Figure 201

CAUTION: DO NOT OVERTIGHTEN NUT IN ATTEMPT TO STOP LEAKS.

(2) If leaks are found, carefully repeat steps B and C.

(3) If leaks persist, replace tube assembly or fitting.

TEMPORARY REVISION NO. 13-2 (Sheet 1 of 6).

Insert following 13-2-1, Page 203, dated Nov. 4/60.

Add the following new Section 13-2-2.

TYPICAL COMBINATIONS FOR INSTALLING STANDARD TUBING CONNECTIONS

1. General

Standard tubing fittings are installed in the airplane in accordance with Military Standards MS33566. Most of the possible standard combinations are contained in one of the following categories:

A. Typical Combinations for Installing Flareless Tubing End Fittings.

These combinations consist of the connection of various valves, unions, elbows, tees, etc., to a flareless tube end assembly or cap, as shown in Figure 1. Refer to 13-2-1 for installation and tightening procedures.

B. Typical Combinations for Attaching Bulkhead Fittings to Structure.

(1) Fuel-Tight Areas.

Fittings installed through fuel-tight bulkheads, spars, etc. shall be installed with one MS29512 gasket on each side of the bulkhead, as shown in Figure 2.

(2) Pressure Areas.

Fittings installed through pressure webs or bulkheads will require pressure sealant fillets of EC-1293 on pressure side in addition to the washers which may be required, as shown in Figure 2. Refer to Chapter 51, STRUCTURES GENERAL for application of pressure sealants.

(3) All Other Areas.

Fittings shall be installed through bulkheads and structure, as shown in Figure 2.

TEMPORARY REVISION NO. 13-2 (Sheet 2 of 6).

C. Typical O-Ring Seal Combinations.

O-ring type seals are required for installation of valves, unions, tees, etc. into equipment or fittings with internal threads, as shown in Figure 3. Care must be taken to select the O-ring compatible to the system in which it is to be used; in some cases O-rings are not interchangeable from system to system.

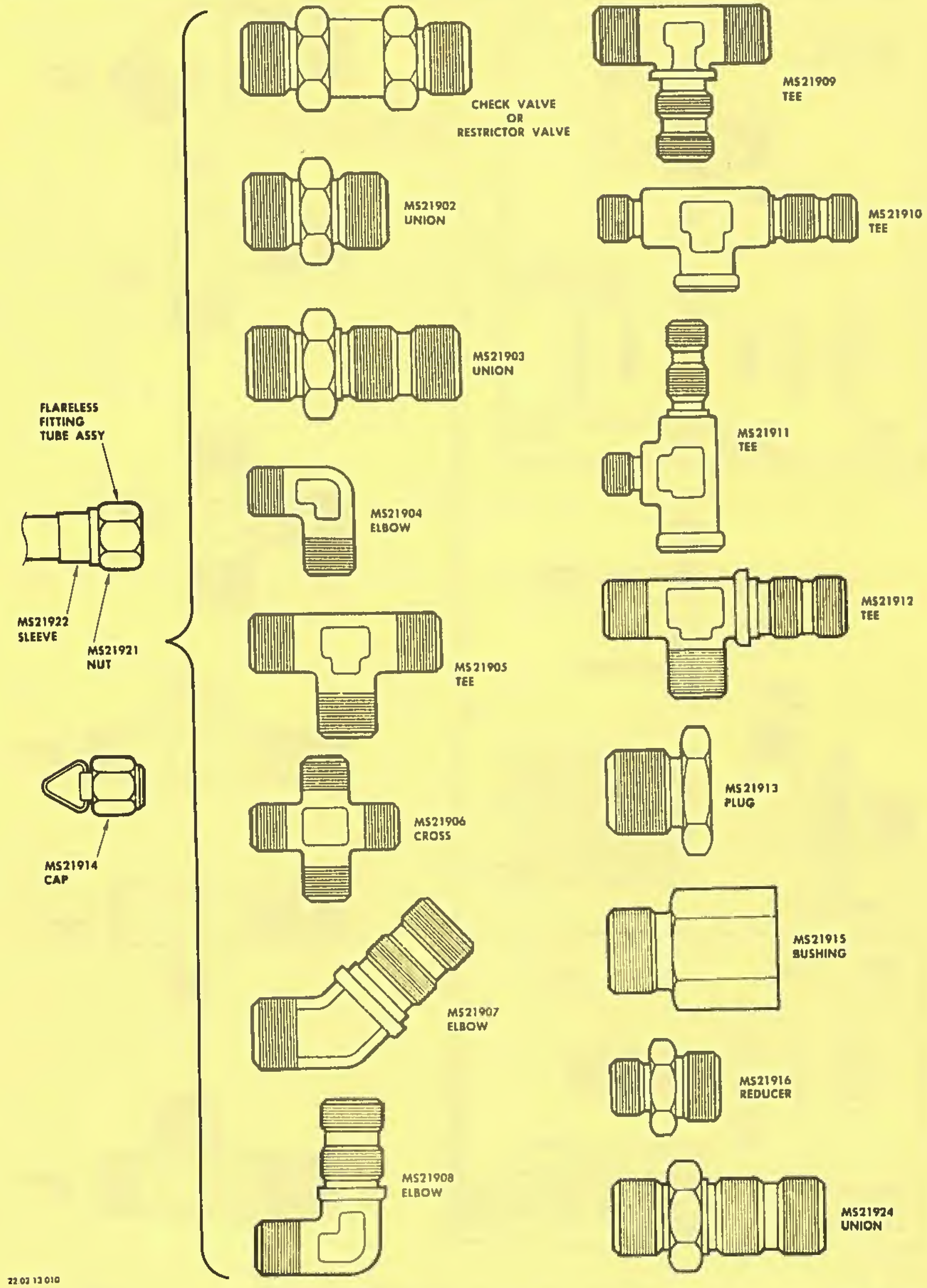
D. Typical Combinations for Installing Bulkhead Fittings into an Equipment Boss.

In areas where bulkhead fittings are installed directly into an equipment boss, installation shall be made as shown in Figure 4.

E. Wiggins-Type Fuel Line Fittings.

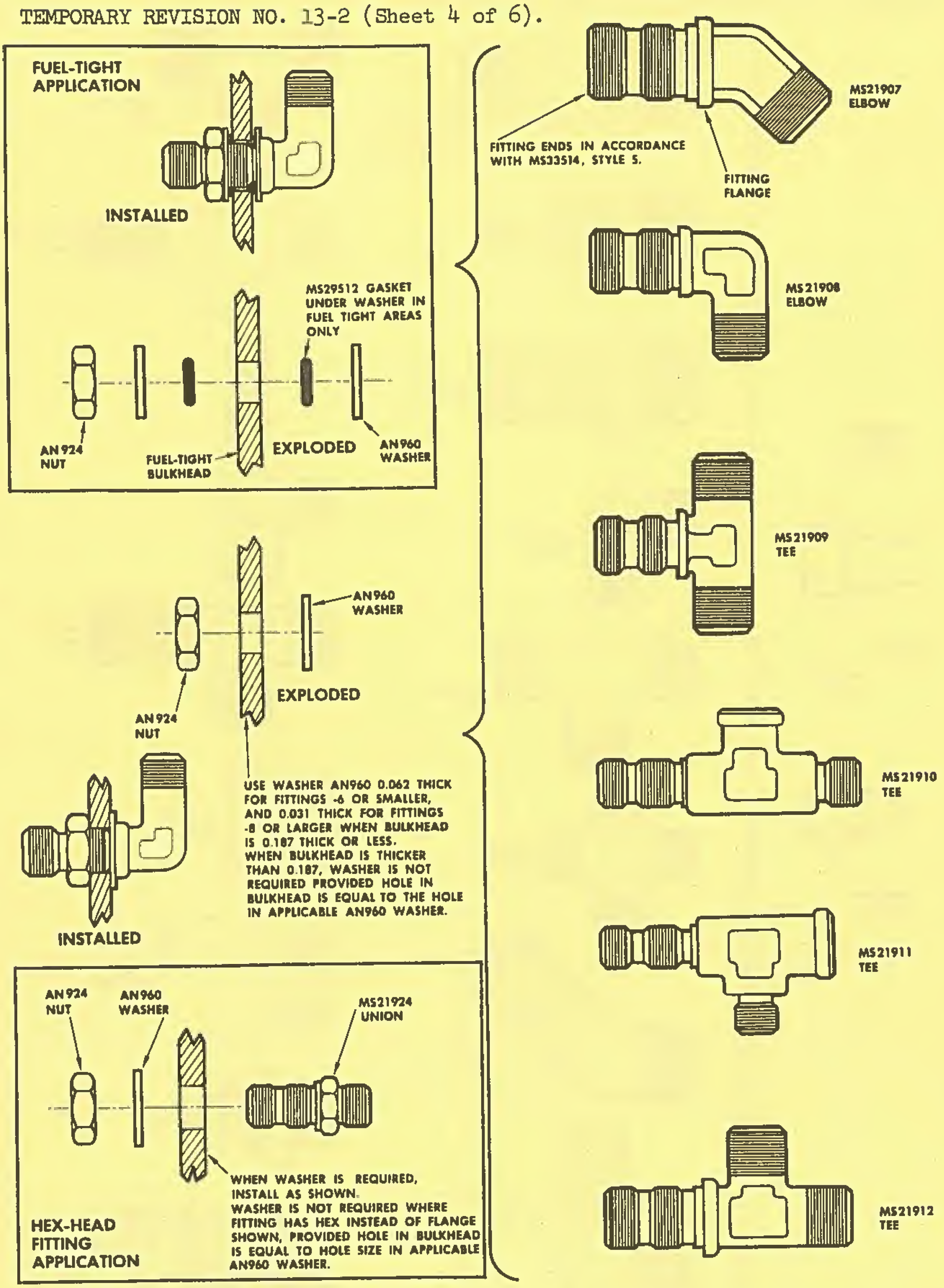
Refer to Chapter 28, FUEL, for installation of Wiggins-type fuel line fittings.

TEMPORARY REVISION NO. 13-2 (Sheet 3 of 6)



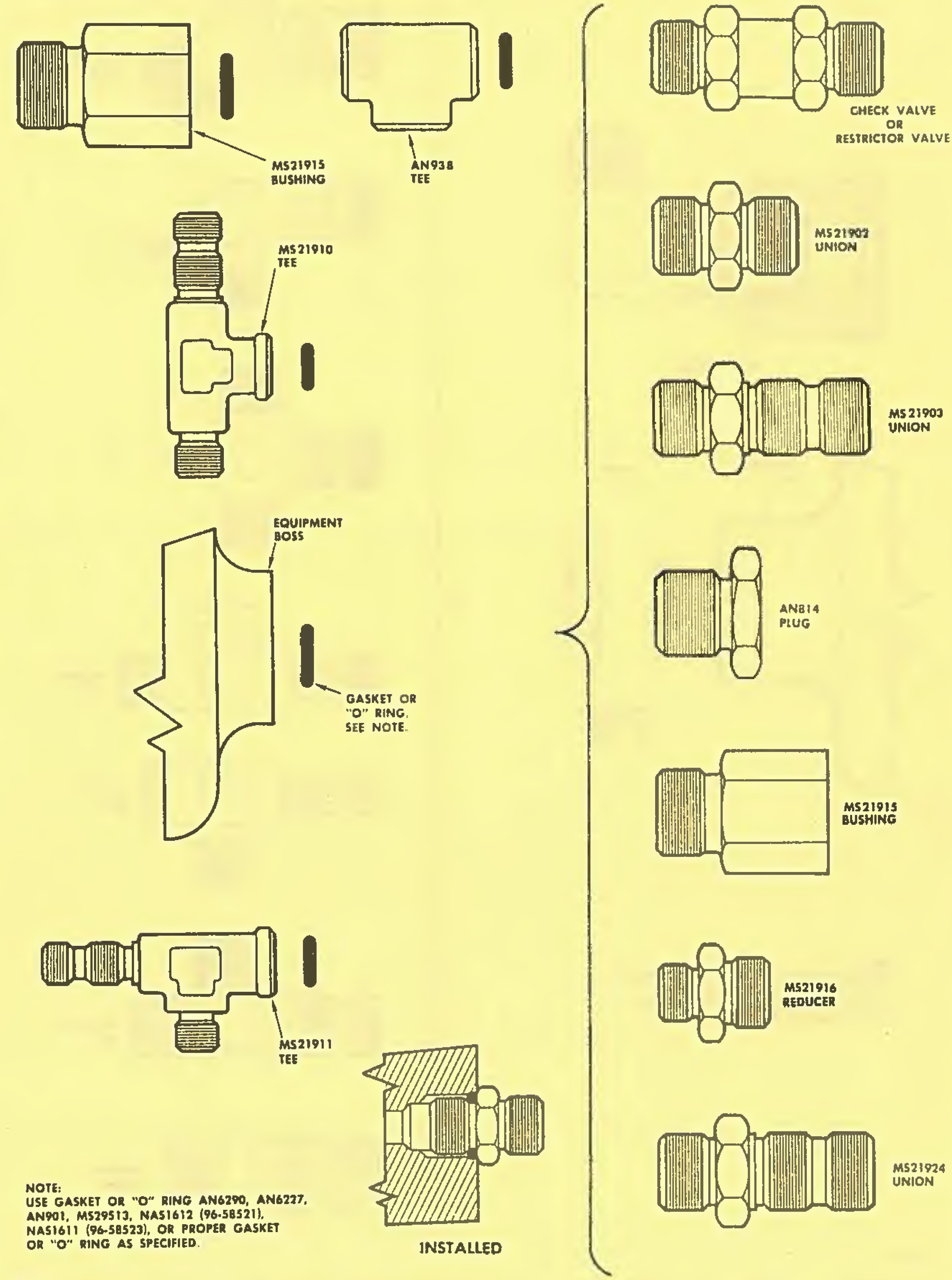
Typical Combinations for Installing
Flareless Tubing End Fittings
Figure 1

TEMPORARY REVISION NO. 13-2 (Sheet 4 of 6).



Typical Combinations for Attaching
Bulkhead Fittings to Structure
Figure 2

TEMPORARY REVISION NO. 13-2 (Sheet 5 of 6).



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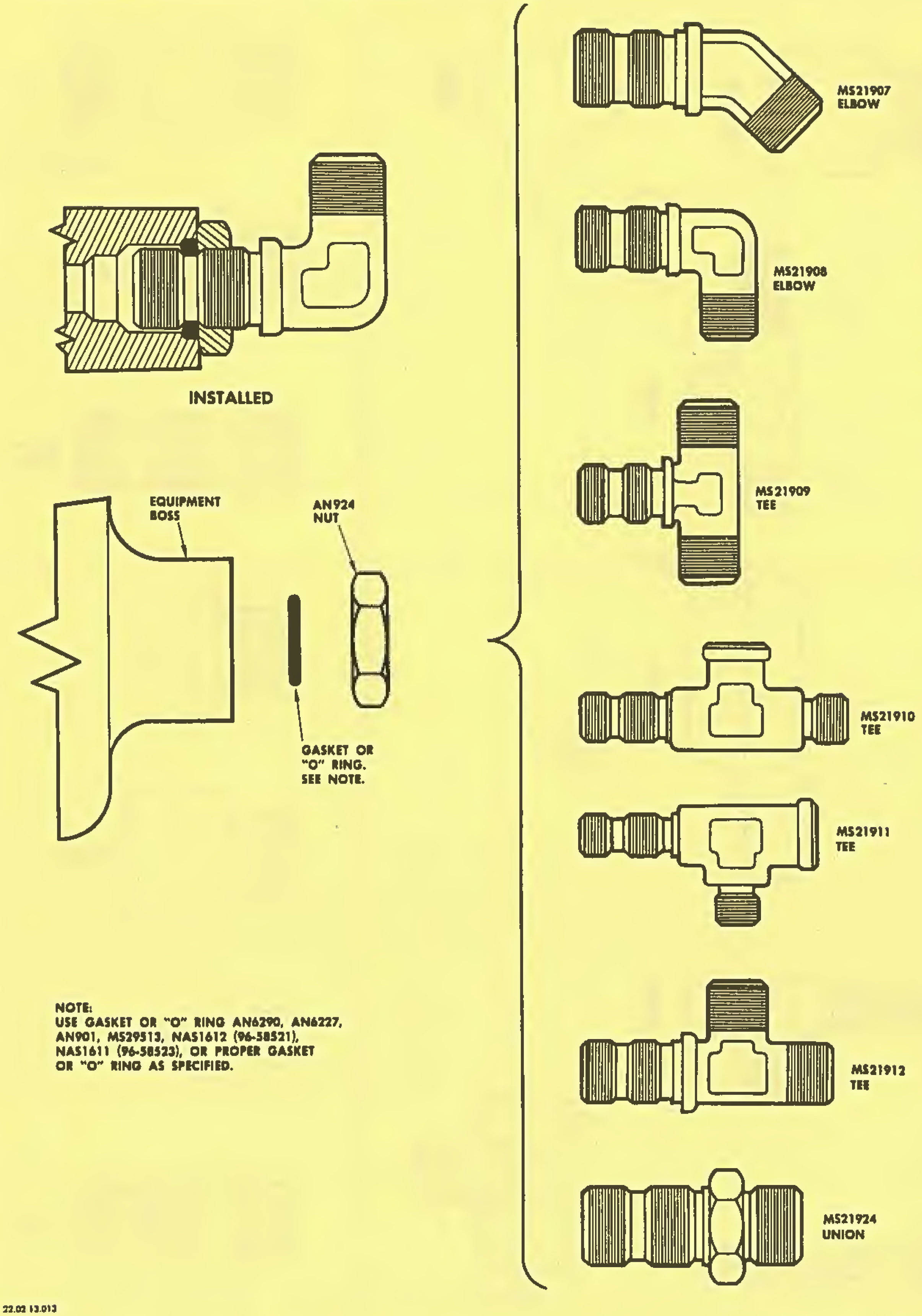
Typical O-Ring Seal Combinations
Figure 3

TEMPORARY REVISION NO. 13-2 (Sheet 6 of 6)



Typical Combinations For Installing Bulkhead Fittings Into An Equipment Boss
Figure 4

TYPICAL COMBINATIONS FOR INSTALLING STANDARD TUBING CONNECTIONS

1. General

Standard tubing fittings are installed in the airplane in accordance with Military Standards MS33566. Most of the possible standard combinations are contained in one of the following categories:

A. Typical Combinations for Installing Flareless Tubing End Fittings.

These combinations consist of the connection of various valves, unions, elbows, tees, etc., to a flareless tube end assembly or cap, as shown in Figure 1. Refer to 13-2-1 for installation and tightening procedures.

B. Typical Combinations for Attaching Bulkhead Fittings to Structure.

(1) Fuel-tight areas.

Fittings installed through fuel-tight bulkheads, spars, etc. shall be installed with one type 600 Parker Gasko Seal on the fuel side of the bulkhead, as shown in Figure 2.

(2) Pressure areas.

Fittings installed through pressure webs or bulkheads will require pressure sealant fillets of EC-1293 on pressure side in addition to the washers which may be required, as shown in Figure 2. Refer to Chapter 51, STRUCTURES GENERAL for application of pressure sealants.

(3) All other areas.

Fittings shall be installed through bulkheads and structure, as shown in Figure 2.

C. Typical O-Ring Seal Combinations.

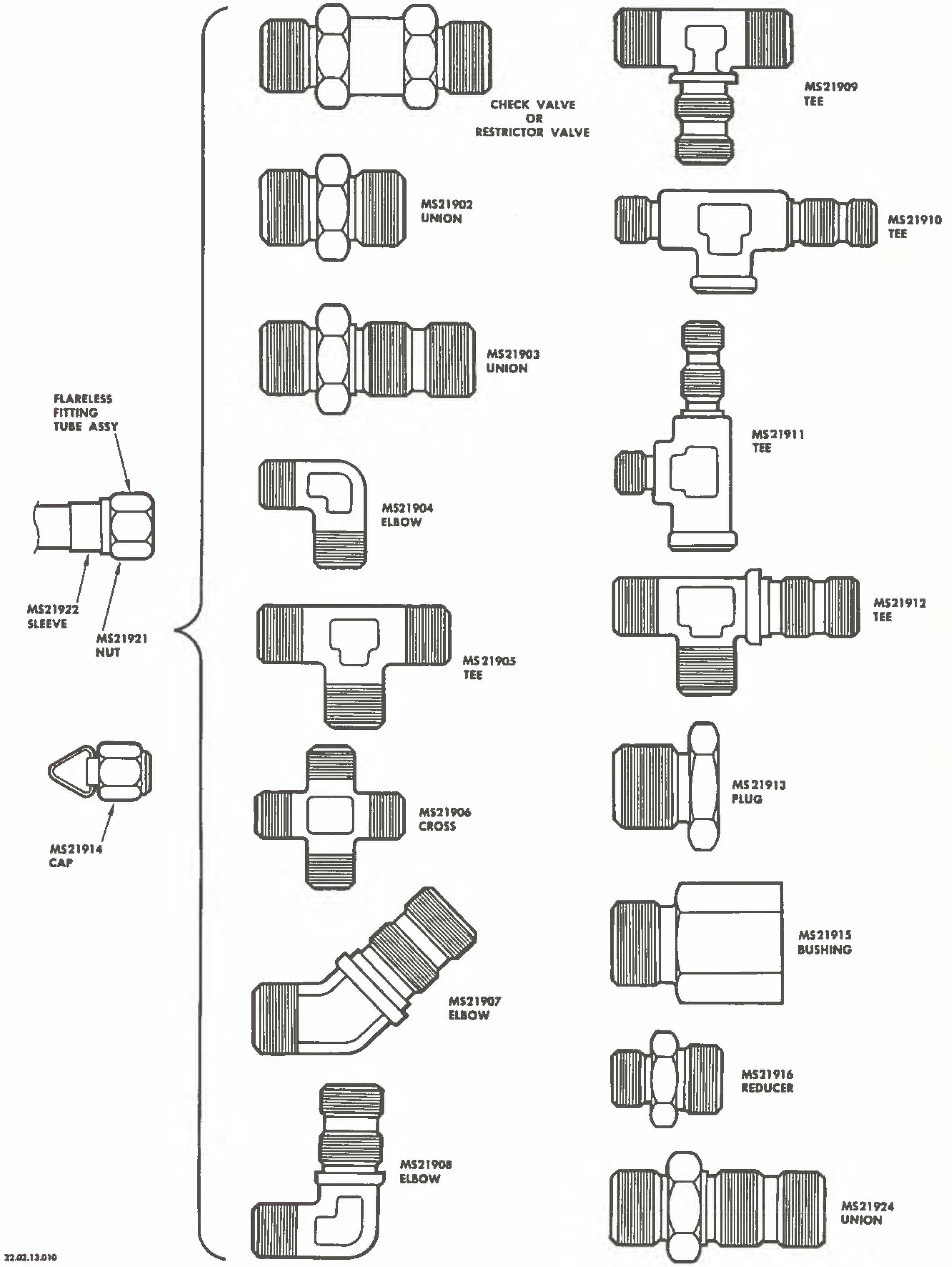
O-ring type seals are required for installation of valves, unions, tees, etc. into equipment or fittings with internal threads, as shown in Figure 3. Care must be taken to select the O-ring compatible to the system in which it is to be used; in some cases O-rings are not interchangeable from system to system.

D. Typical Combinations for Installing Bulkhead Fittings into an Equipment Boss.

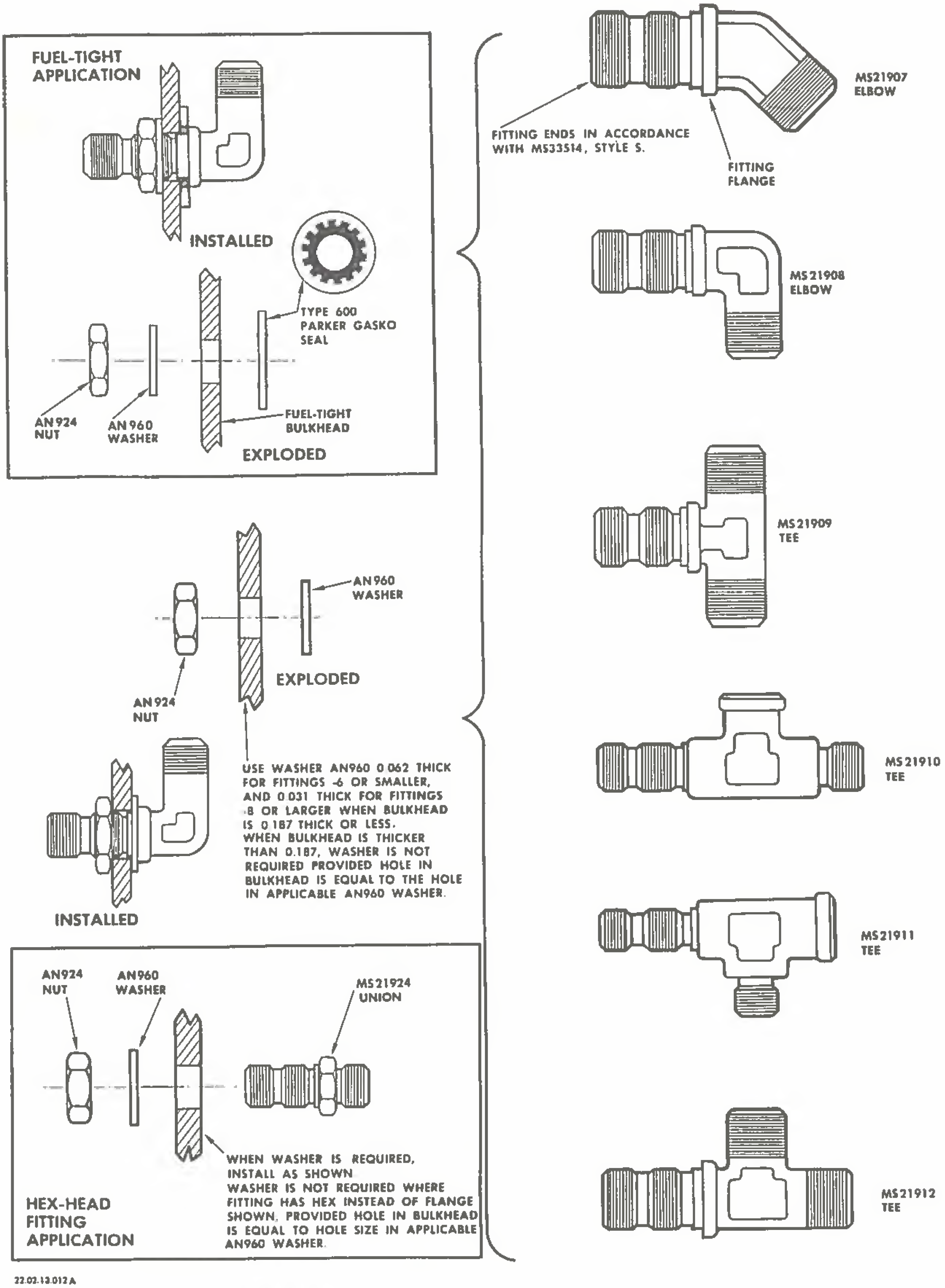
In areas where bulkhead fittings are installed directly into an equipment boss, installation shall be made as shown in Figure 4.

E. Wiggins-Type Fuel Line Fittings.

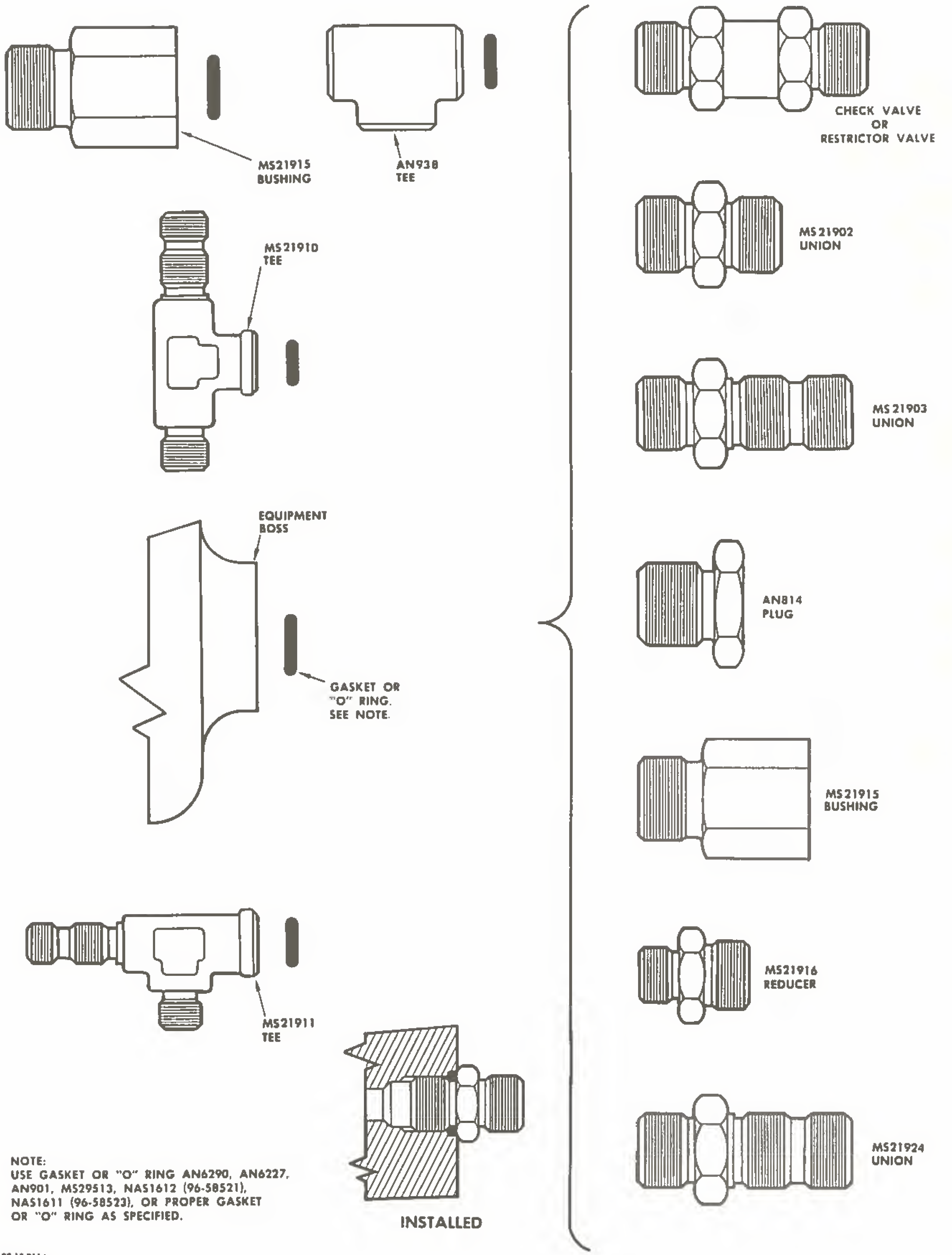
Refer to Chapter 28, FUEL, for installation of Wiggins-type fuel line fittings.



Typical Combinations for Installing
Flareless Tubing End Fittings
Figure 1



Typical Combinations for Attaching Bulkhead
Fittings to Structure
Figure 2



NOTE:
USE GASKET OR "O" RING AN6290, AN6227, AN901, MS29513, NAS1612 (96-58521), NAS1611 (96-58523), OR PROPER GASKET OR "O" RING AS SPECIFIED.

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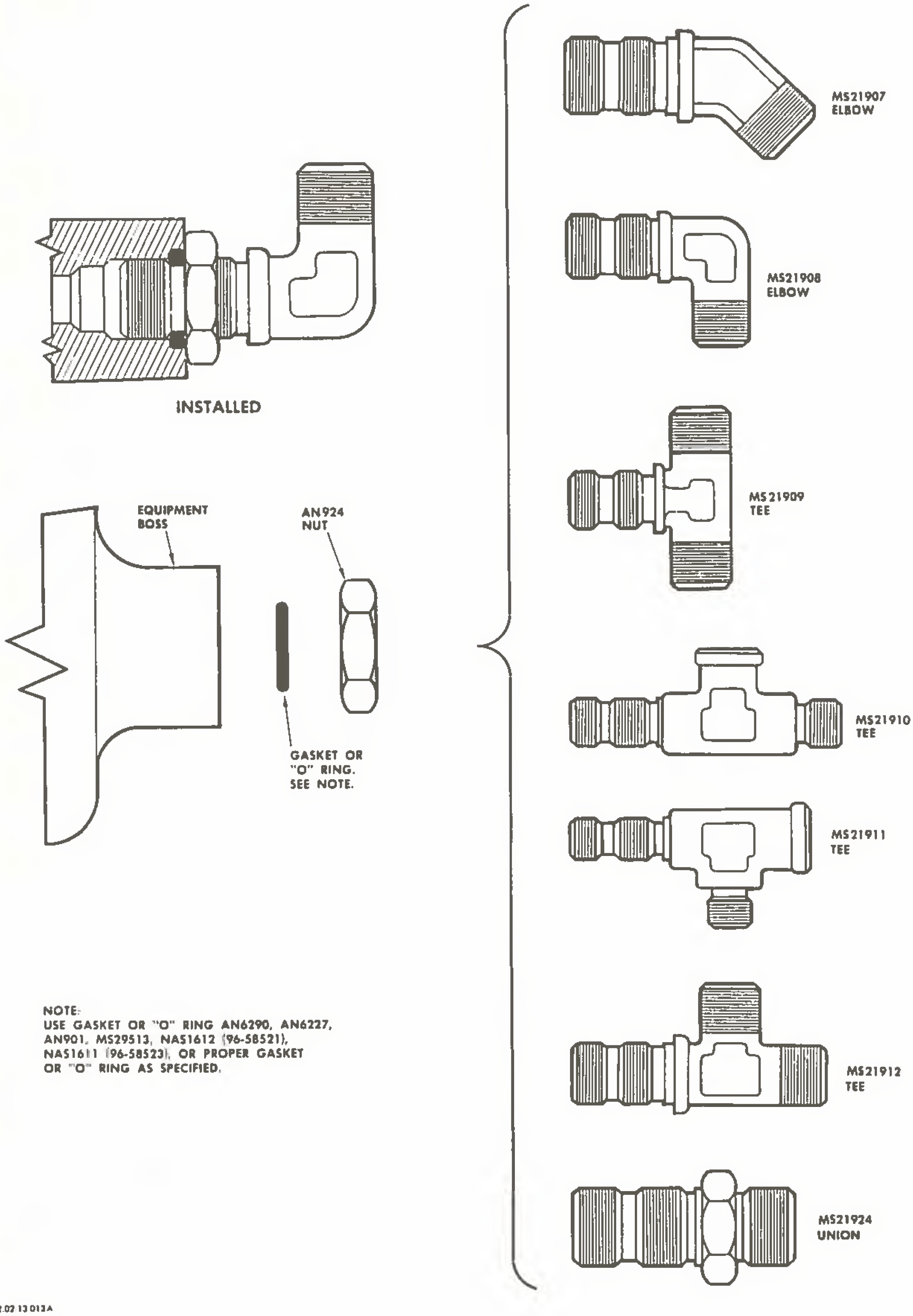
Typical O-Ring Seal Combinations
Figure 3



Typical Combinations for Installing Bulkhead
Fittings Into An Equipment Boss
Figure 4